

ผลของชาใบหม่อนต่อการควบคุมระดับน้ำตาลในเลือด และความไวต่ออินซูลินในผู้ที่มีภาวะ
ก่อนเบาหวานและผู้ที่ยังไม่เป็นเบาหวาน

**The effect of *Irvingia Gabonensis* on postprandial glycemc control and
Insulin sensitivity in pre-diabetic and non-diabetic subjects**

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ABSTRACT

Recent epidemiology study has estimated that the prevalence of diabetes is increasing at an extremely higher rate. One of the most well known oriental herbs is *Irvingia gabonensis*, which has been shown to be efficacious for the treatment and prevention of diabetes in rat (Omoruyi F, Adamson I. Department of Biochemistry, University of Benin, Nigeria.). . The purpose of this study is to evaluate the influence of *Irvingia Gabonensis* on postprandial plasma glucose level and insulin sensitivity. This study was conducted on 14 subjects, with a crossover design. Subjects were initially screened for non-diabetic status (FBS: < 126 mg/dL). Subjects were randomized to drink either 100ml of *Irvingia Gabonensis* or water 30 minutes prior to 75 grams sucrose solution. Venous blood samples were collected before sucrose ingestion (time point 0) and at 30, 60, 90, 120, and 150 minutes after. After OGTT, participants kept a diary of severity of abdominal and other symptoms score scales. The author found that the *Irvingia Gabonensis* sample group tends to have a lower level of plasma glucose, serum insulin concentrations compared to the controlled group, with significant difference of plasma glucose at 30 (P=0.015), 60 (P=0.022), 120(0.012) and 150(P<0.01) minutes . The mean difference of the incremental glucose level at each time point also tends to be lower for the *Irvingia Gabonensis* group, with significant difference at 30-min time point (P< 0.01) , 60-min time point (P=0.008) , 90-min time point (P=0.039) , 120-min time point(P=0.019) , 150-min time point (P<0.001) . To conclude, in non-diabetic subjects, consumption of *Irvingia Gabonensis* aid in postprandial glycemc control during the first 30,60,120

and 150 minutes after meal. *Irvingia Gabonensis* does not influence the physiological insulin sensitivity and does not cause significant adverse events.

Keywords: Antihyperglycemic / Insulin sensitivity / *Irvingia Gabonensis* / OGTT / Pre-diabetes / Non-diabetes

Introduction

Diabetes does not only have impact against quality of life and physical well being, it also affects patients and their relatives economically. In 2006, the American Diabetes Association, abbreviated as ADA, has made estimation for the national costs of diabetes merely in the USA in year 2002 to be 132 billion US dollars, and it is projected to increase to 192 billion US dollars in year 2020 (American Diabetes Association, 2003).

Preventions and treatments of diabetes are not only available with conventional medicine, but also with traditional medicine. For centuries, local traditional medicines were implemented in countries around the world as natural remedies against illness as well as for tonic and prophylaxis propose. One of the most well known oriental herbs is *Irvingia gabonensis*, which has been shown to be efficacious for the treatment and prevention of diabetes in rat (Omoruyi F, Adamson I. Department of Biochemistry, University of Benin, Nigeria.)

Clearly, it is imperative for members of the medical research throughout the globe to converge their attention on developing new interventions as well as improving existing treatments that can effectively diagnose diabetes, alleviate its symptoms, and most importantly, prevent the evitable. With *Irvingia gabonensis* as the potential supportive and preventive option for diabetes and pre-diabetes, this study aimed to determine its effect in non-diabetic subjects on levels of plasma glucose, insulin, and the corresponding insulin sensitivity index. In addition, this study determined the correlation of *Irvingia gabonensis* co-ingestion with a meal and the symptoms afterward.

Research Objectives

1. To evaluate the influence of *Irvingia gabonensis* on the blood glucose and whole body physiological insulin sensitivity response to ingestion of sucrose solution by non-diabetic subjects.
2. To evaluate the severity of abdominal and other symptoms of the subjects after co-ingestion of *Irvingia gabonensis* with sucrose solution.

Research Design

Subject selection: 14 participants were selected according to the designed criteria to join the experiment. They were randomized into 2 groups; the treatment group and control group.

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Standard Intervention: Each participant from both groups ingested 75 grams of sucrose solution with a prepared beverage. The beverage given to the treatment group was *Irvingia gabonensis* extract solution while the control group was given water.

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Result Measurements: Venous blood samples were collected from all participants for measurement of their blood glucose and insulin levels right before the ingestion and every 30 minutes afterward for a total of 6 times. (0, 30, 60, 90, 120, 150)

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Adverse Event Monitoring: After the experiment, all participants kept a diary of severity of abdominal and other symptoms rated on a linear scale to monitor the effect of the beverages they received.

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Crossover Intervention: After a washout period of 1 week, all participants repeated the test with the opposite treatment. This included result measurements and monitoring of adverse events.

Research Type

This research is an experimental study, designed to be a randomized, opened-label, controlled, crossover clinical trial.

Result

Table 1 Plasma Glucose Levels of the Subjects during Oral Glucose Tolerance Plasma Glucose.

Time point (min)	Plasma glucose level (mg/dL)		P-value Between group
	Irvingia Gabonensis solution	water	
T0	103.09 ± 1.21	102.46 ± 1.32	0.731
T30	163.23 ± 1.79	168.79 ± 1.15	0.015
T60	187.28 ± 0.67	190.25 ± 1.02	0.022
T90	168.57 ± 1.05	171.88 ± 1.30	0.059
T120	141.35 ± 2.78	149.60 ± 0.68	0.012
T150	120.10 ± 1.00	133.99 ± 1.30	<0.001

Test after Ingesting either *Irvingia ganonensis* solution or Water.

Table 2 Mean Difference of Incremental Plasma Glucose.

Time point (min)	Mean difference of plasma glucose level (mg/dL)		P-value Between group
	Irvingia Gabonensis solution	Warm	
T0-30	60.14 ± 1.24	66.32 ± 0.73	<0.01
T0-60	84.20 ± 0.62	87.79 ± 1.07	0.008
T0-90	65.49 ± 1.46	69.41 ± 1.05	0.039
T0-120	38.26 ± 3.26	47.14 ± 1.37	0.019
T0-150	17.01 ± 2.03	31.53 ± 1.35	<0.001

Table1 illustrate the effect of *Irvingia Gabonensis* versus water on the concentration of plasma glucose in non-diabetic subjects. It can be seen that plasma

glucose levels for the *Irvingia Gabonensis* sample group tends to be lower than the water group, with less steep rise and fall (fluctuation). And, the difference is significant

Table 2 show the mean difference value for the incremental concentration of plasma glucose compared to baseline (T0). This data represents the change in blood glucose level over time. It can be seen that the change in blood glucose for the water group is greater, with significant difference during the 30 minutes ($P < 0.01$) 60 minute (0.008) 90 minutes (0.039) 120 minutes(0.019) 150 minutes (<0.001). During the first 30 minutes of OGTT, the glucose levels of the *Irvingia Gabonensis* sample group raised 60.14 ± 1.24 mg/dL on average, as compared to a rise of 66.32 ± 0.73 mg/dL for the water sample group. During the 60 minutes of OGTT, the glucose levels of the *Irvingia Gabonensis* sample group raised 84.20 ± 0.62 mg/dL on average, as compared to a rise of 87.79 ± 1.07 mg/dL for the water sample group. During the 90 minutes of OGTT, the glucose levels of the *Irvingia Gabonensis* sample group raised 65.49 ± 1.46 mg/dL on average, as compared to a rise of 69.41 ± 1.05 mg/dL for the water sample group. During the 120 minutes of OGTT, the glucose levels of the *Irvingia Gabonensis* sample group raised 38.26 ± 3.26 mg/dL on average, as compared to a rise of 47.14 ± 1.37 mg/dL for the water sample group. During the 150 minutes of OGTT, the glucose levels of the *Irvingia Gabonensis* sample group raised 17.01 ± 2.03 mg/dL on average, as compared to a rise of 31.53 ± 1.35 mg/dL for the water sample group.

Table 3 Serum Insulin Levels of the Subjects during Oral Glucose Tolerance Test

Time point (min)	Serum insulin level (μ L.U./ml)		P-value Between group
	Irvingia Gabonensis	Warm water	
T0	12.53 \pm 0.26	12.18 \pm 0.17	0.248
T30	42.01 \pm 0.88	44.07 \pm 0.91	0.114
T60	50.71 \pm 1.05	52.97 \pm 0.78	0.097
T90	58.93 \pm 1.02	61.31 \pm 0.86	0.086
T120	48.42 \pm 1.21	49.53 \pm 1.01	0.486
T150	31.74 \pm 0.47	32.78 \pm 0.48	0.134

Table 4 Mean difference of Incremental Serum Insulin Levels

Time point (min)	Mean difference of serum insulin level (μ L.U./ml)		P-value Between group
	Irvingia Gabonensis	Water	
T0-30	29.48 \pm 0.99	31.89 \pm 0.90	0.084
T0-60	38.19 \pm 1.20	40.78 \pm 0.82	0.086
T0-90	46.40 \pm 1.16	49.12 \pm 0.87	0.072
T0-120	35.89 \pm 1.21	37.35 \pm 1.02	0.367
T0-150	19.21 \pm 0.44	20.60 \pm 0.53	0.056

Table 3 illustrate the effect of *Irvingia Gabonensis* versus water on the concentration of serum insulin in non-diabetic subjects. It can be seen that serum insulin levels for the *Irvingia Gabonensis* sample group tends to be lower than the water group, with less steep rise and fall (fluctuation). However, the difference is not significant.

Table 4 show the mean difference value for the incremental concentration of serum insulin compared to baseline (T0). This data represents the change in blood insulin level over time. It can be seen that serum insulin levels for the *Irvingia Gabonensis* sample group tends to be lower than the warm water group, but without significant difference.

Discussion

Based on Table 1 and Table 3, the author did observe significant difference in glucose during 30 minutes, 60 minutes, 120 minutes and 150 minutes but without significant in insulin. Although the trends of insulin parameters seem to be lower for the *Irvingia Gabonensis* group, the difference is subtle.

The mean differences of incremental glucose values compared to baseline are different, with statistical significance during the first 30 minutes, 60 minutes, 90 minutes, 120 minutes and 150 minutes of the test), shown in Table 2. During the time of the test of OGTT, the glucose level of *Irvingia Gabonensis* group raise lower than water group with statistical significant. This statistic implies that consumption of *Irvingia Gabonensis* may aid in postprandial glycemc control during the 180 minutes after meal.

Base on Table 4 despite the insignificant difference of insulin level between *Irvingia Gaboenesis* group and the control group, the result of each individual subject shows that the *Irvingia Gabonensis* sample group has a lower insulin I compared to the control group.

Conclusion

In non-diabetic subjects, consumption of *Irvingia Gabonensis* aid in postprandial glycemc control during the 30,60,120,180 minutes after meal. However *Irvingia Gaboenesis* does not influence the physiological insulin sensitivity and does not cause significant adverse events.

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