

High Institute of Public Health
Department of Nutrition

Effect of Different Commercial Artificial Sweeteners versus Sucrose on the Weight and Diabetic Profile in Male Rats

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In

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Amel El Sch
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Presented by



Nermine Aly Khamis Amin

MBChB, Faculty of Medicine, Alexandria University, 2012
Master of Nutrition, High Institute of Public Health, Alexandria University, 2016

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ABSTRACT

The aim of this study was to investigate the effect of sucralose commercially known as (Sweetal) and aspartame commercially known as (Sugar-Match) as the commonly consumed artificial sweeteners by Egyptians, on weight and diabetic profile after 12 weeks of consumption at different levels, versus the normal sucrose and how these sweeteners affect the fat content and distribution in the body organs of rats.

Sixty healthy adult male albino rats of weighing 150-200g were grouped into 10 groups; each group included 6 rats. The study was implemented over two phases. During the first phase which lasted 12 weeks artificial sweeteners were given to the experimental animals. After 12 weeks of intake, artificial sweeteners supplementation was omitted for 6 weeks after which the animals were sacrificed and the study progressed.

In phase I, the experiment was conducted for 12 weeks; the following measurements were made after 6 weeks and after 12 weeks:

- Anthropometry.
- Fasting blood glucose.
- Glycated hemoglobin (HbA1C %).
- Serum Insulin.
- HOMA-IR.
- Complete blood count (CBC) including (Hb, HCT, RBCs, MCV, MCH, MCHC, WBCs, Platelets, Lymphocytes, Neutrophils, Monocytes, Eosinophils, Basophils).
- Lipid profile including (LDL, HDL, Triglycerides, Total Cholesterol).

Phase II the aim was to determine the possibility of restoration of normal parameters after terminating the intake of artificial sweeteners. Four groups of rats were fed the following normal diet for 12 weeks and the following measurements were made:

- Anthropometry.
- Fasting blood glucose.
- Glycated hemoglobin (HbA1C %).
- Serum Insulin.
- HOMA-IR.
- Complete blood count (CBC) including (Hb, HCT, RBCs, MCV, MCH, MCHC, WBCs, Platelets, Lymphocytes, Neutrophils, Monocytes, Eosinophils, Basophils).
- Lipid profile including (LDL, HDL, Triglycerides, Total Cholesterol)

The study showed the following results:

- Feeding the male rats on diet containing Sugar-Match (Aspartame) and Sweetal (Sucralose) for 12 weeks increased all of the following:
 1. Fasting blood glucose level.
 2. HOMA-IR which is a measure of insulin resistance, the increase was more prominent in rats fed high doses of either sweetener.

3. Glycated haemoglobin (HbA1c) which is a measure of the blood glucose level during the last 3 months, the increase was significant only with rats fed on low and high doses of Sweetal.
 4. Total cholesterol level.
 5. Triglycerides level, the increase was more prominent with Sugar-Match feeding.
 6. Low density lipoprotein level (LDL), the increase was more evident with the groups fed on Sugar-Match.
 7. Some of the organs weight expressed as a percentage of total body weight, this increase was mostly significant in liver and pancreas, and was more prominent with the groups fed on Sugar-Match.
- Feeding the male rats on diet containing Sugar-Match (Aspartame) and Sweetal (Sucralose) for 12 weeks decreased all of the following:
 1. High density lipoprotein level (HDL), this effect was more evident when compared with either the control or the sucrose groups.
 2. Haemoglobin concentration, this decrease was more prominent with Sweetal treated groups especially with high doses of Sweetal.
 3. Other haematological parameters as (MCV, Haematocrit, and Platelet count), this decrease was more prominent with Sweetal treated groups.