Biological Studies on the Effect of Sucralose in Rats

Thesis
Submitted to the Faculty of Science,
Ain Shams University, Cairo, Egypt

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For the Award of the Ph. Degree in Physiology

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2013

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ABSTRACT

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Ph. D Thesis, Ain Shams University (2013)
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Key words: Gamma Radiation- Streptozotocin- Diabetes- Sucralose- Glycated hemoglobin- Insulin- Lipid profile- Antioxidant biomarkers- Brain and Testis tissues- Sperm head abnormalities.

The aim of the present work is to evaluate the biological effects of sucralose, one of the newest artificial sweeteners, in normal healthy rats, diabetic rats and γ- irradiated rats.

Diabetes was induced after an intraperitoneal streptozotocin injection (65 mg/kg body weight). γ-irradiation was performed by whole body exposure of rats to gamma ray 1Gy/week up to 6Gy. Sucralose was administered daily during experimental period by oral gavages at a dose of 11mg/kg body weight to normal healthy rats, diabetic rats and irradiated rats.

The results revealed that the administration of sucralose to normal healthy rats, diabetic rats and irradiated rats induced a significant decrease in the level of glucose, and glycated hemoglobin (HbA1c), while had no effect on the level of insulin and hemoglobin, compared to their respective values in the groups of rats not receiving sucralose. Moreover, the administration of sucralose provoked a significant decrease in the level of triglycerides and a significant increase in the level of total cholesterol, low

density lipoprotein-cholesterol (LDL-C), and high density lipoprotein-cholesterol (HDL-C).

Nevertheless, sucralose has no effect on serum electrolyte levels; sodium (Na^+), chloride (Cl^-), potassium (K^+) and calcium (Ca^{2+}). Furthermore, sucralose has no effect on blood cells count; red blood cells (RBCs), total white blood cells (WBCs), neutrophils and lymphocytes, compared to their respective values in the group of rats not receiving sucralose.

Biochemical analysis in brain and testis tissues showed that sucralose has no effect on the antioxidant biomarkers: superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase (GSH-Px), and glucose-6-phosphate dehydrogenase activities (G-6-PDH), and glutathione content (GSH). Moreover, its administration to normal healthy rats has no effect on thiobarbituric acid reactive substances (TBARS) while in diabetic rats and irradiated rats sucralose induces a significant decrease, compared to its respective value in the groups of rats not receiving sucralose. Cytogenetic analysis in testis showed that sucralose has no effect on sperm head abnormalities.

According to the results obtained, it could be postulated that sucralose didn't induce oxidative stress, had no effect on insulin, electrolytes, blood cells count, and sperm head abnormalities, while might interfere with glucose absorption, and provokes an increase of cholesterol level. Further studies are needed on a larger scale to give more information about the effect of sucralose.

TABLE OF CONTENTS

Acknowledgements……..

ABSTRACT……. ii

List of abbreviations……. iv

List of tables……. vi

List of figures…… ix

INTRODUCTION ……... 1

AIM OF WORK……... 3

1. REVIEW OF LITERATURE

1.1. Sucralose…… 5

1.1.1. Structure and properties…… 5

1.1.2. History and regulations……. 10

1.1.3. Biological effects of sucralose …… 11

1.2. Oxidative Stress…….. 15

1.2.1. Sources of reactive oxygen species…….. 15

1.2.2. Overview on antioxidants …… 17

1.2.3. Markers of oxidative stress…….. 21

1.3. Diabetes Mellitus……. 22

1.3.1. Types of diabetes……. 23

1.3.2. Mechanisms of formation of reactive oxygen species in diabetes……. 25

1.4. Radiation…… 27

1.4.1. Non-ionizing and ionizing radiation……. 28

1.4.2. Direct and Indirect effect of radiation……. 29

1.4.3. Chronic and Acute exposure…… 30

1.5. General Outline on Some Biochemical Parameters 31

1.5. 1. Glucose …… 31

1.5.2. Insulin…….. 33

1.5.3. Hemoglobin ……. 35

1.5.4. Glycated hemoglobin……. 36

1.5.5. Lipids Profile ……. 37

1.5.6. Electrolytes ……. 40

1.6. Impact of Oxidative Stress on the Brain…… 44

1.7. Impact of Oxidative Stress on the Testes…….. 46

1.8. Concise View on Blood Cells……. 48

2. MATERIALS AND METHODS

2.1. Induction of Diabetes……. 52

2.2. γ-Irradiation Process……. 53

2.3. Sucralose Treatment…… 54

2.4. Animal Groups ……. 54

2.5. Preparation of Samples…… 55

2.6. Biochemical Analysis…….. 56

2.6.1. Glucose…… 56

2.6.2. Insulin…… 57

2.6.3. Hemoglobin and glycated hemoglobin…… 58

2.6.4. Serum lipid profile…….. 59

2.6.5. Electrolytes……. 61

2.6.6. Oxidative stress…….. 63

2.7. Sperm Head Abnormalities Assay…….. 66

2.8. Blood Cells Count…… 66

2.9. Statistical Analysis…… 67

3- RESULTS

3.1. Influence of Sucralose on Glucose and Insulin 68

3.2. Influence of Sucralose on Hemoglobin and Glycated Hemoglobin ……. 72

3.3. Influence of Sucralose on Lipid Profile ……. 76

3.4. Influence of Sucralose on Electrolytes …….. 83

3.5. Influence of Sucralose on Oxidative Stress in Brain and Testis …….. 89

3.6. Influence of Sucralose on Blood Cells Count…… 113

3.7. Influence of Sucralose on Sperm Head Abnormalities…… 119

4- DISCUSSION

4.1. Influence of Sucralose on Glucose and Insulin …… 124

4.2. Influence of Sucralose on Hemoglobin and Glycated Hemoglobin……..…… 128

4.3. Influence of Sucralose on Lipid Profile ……... 131

4.4. Influence of Sucralose on Electrolytes……. 135

4.5. Influence of Sucralose on Oxidative Stress in Brain and Testis……... 138

4.6. Influence of Sucralose on Blood Cells Count…….. 146

4.7. Influence of Sucralose on Sperm Head Abnormalities…… 148

CONCLUSION…… 151

REFERENCES……. 153

SUMMARY……..… 189

ARABIC SUMMARY……..... 195

ARABIC ABSTRACT……....

List of Tables

Table 1 Influence of sucralose on the level of glucose and insulin in the serum of rats……	70
Table 2 Influence of sucralose on hemoglobin (Hb) and glycated hemoglobin (HbA1c) levels in the blood of rats……..	74
Table 3 Influence of sucralose on the content of total cholesterol, and triglycerides in the serum of rats…….	79
Table 4 Influence of sucralose on the content of high density lipoprotein-cholesterol (HDL-C) and low density lipoprotein-cholesterol (LDL-C) in the serum of rats…….....	81
Table 5 Influence of sucralose on the level of calcium (Ca^{+2}) and chloride (Cl^{-}) in the serum of rats...	85
Table 6 Influence of sucralose on the level of potassium (K^{+}) and sodium (Na^{+}) in the serum of rats……..	87
Table 7 Influence of sucralose on the level of thiobarbituric acid reactive substances (TBARS) in the brain and testis of rats…….	91

Table 8 Influence of sucralose on the activity of superoxide dismutase (SOD) in the brain and testis of rats…….	95
Table 9 Influence of sucralose on the activity of catalase in the brain and testis of rats……	99
Table 10 Influence of sucralose on the activity of glutathione peroxidase (GSH-Px) in the brain and testis of rats…….	103
Table 11 Influence of sucralose on the activity of glucose-6-phosphate dehydrogenase (G-6-PDH) in the brain and testis of rats……..	107
Table 12 Influence of sucralose on the content of glutathione (GSH) in the brain and testis of rats…….	111
Table 13 Influence of sucralose on red blood cells (RBCs) and total white blood cells (WBCs) count in the blood of rats…….	115
Table 14 Influence of sucralose on neutrophils and lymphocytes count in the blood of rats…..	117
Table 15 Influence of sucralose on sperm head abnormalities in the testis of rats …….	121

List of Figures

Fig. 1 Sucrose and sucralose structures…….	6
Fig. 2 Hydrolysis products of sucralose…….	9
Fig. 3 Influence of sucralose on the level of glucose in the serum of rats……	71
Fig.4 Influence of sucralose on the level of insulin in the serum of rats ……..	71
Fig. 5 Influence of sucralose on the content of blood hemoglobin ……..……	75
Fig. 6 Influence of sucralose on the content of blood HbA1c……..	75
Fig. 7 Influence of sucralose on the content of total cholesterol in the serum.....…….	80
Fig. 8 Influence of sucralose on the content of triglycerides in the serum ……..……..	80
Fig. 9 Influence of sucralose on the content of serum high density lipoprotein-cholesterol (HDL-C)	82
Fig. 10 Influence of sucralose on the content of serum low density lipoprotein-cholesterol (LDL-C) ….	82

Fig. 11 Influence of sucralose on the level of calcium (Ca^{+2}) in the serum ……..……..	86
Fig. 12 Influence of sucralose on the level of chloride (Cl^{-}) in the serum……	86
Fig. 13 Influence of sucralose on the level of potassium (K^{+}) in the serum …..……..	88
Fig. 14 Influence of sucralose on the level of sodium (Na^{+}) in the serum …….…….	88
Fig. 15 Influence of sucralose on the level of thiobarbituric acid reactive substances (TBARS) in the brain of rats……...	92
Fig. 16 Influence of sucralose on the level of thiobarbituric acid reactive substances (TBARS) in the testis of rats……..	92
Fig. 17 Influence of sucralose on the activity of superoxide dismutase (SOD) in the brain of rats	96
Fig. 18 Influence of sucralose on the activity of superoxide dismutase (SOD) in the testis of rats	96
Fig. 19 Influence of sucralose on the activity of catalase in the brain of rats……	100
Fig. 20 Influence of sucralose on the activity of catalase rats in the testis of rats……	100

Fig. 21 Influence of sucralose on the activity of glutathione peroxidase (GSH-Px) in the brain of rats……..	104
Fig. 22 Influence of sucralose on the activity of glutathione peroxidase (GSH-Px) in the testis of rats ……...	104
Fig. 23 Influence of sucralose on the activity of glucose-6-phosphate dehydrogenase (G-6-PDH) in the brain of rats……..	108
Fig. 24 Influence of sucralose on the activity of glucose-6-phosphate dehydrogenase (G-6-PDH) in the testis of rats ……..	108
Fig. 25 Influence of sucralose on the content of glutathione (GSH) in the brain of rats ……	112
Fig. 26 Influence of sucralose on the content of glutathione (GSH) in the testis of rats...……	112
Fig. 27 Influence of sucralose on red blood cells (RBCs) count…….	116
Fig. 28 Influence of sucralose on total white blood cells (WBCs) count……..	116
Fig. 29 Influence of sucralose on blood neutrophils count……	118

Fig. 30 Influence of sucralose on blood lymphocytes count……	118
Fig. 31 Influence of sucralose on sperm head abnormalities in the testis of rats …….	122