Comparative Study of the Effect of Insulin and Green Tea on the Parotid Gland of Streptozotocin Induced Diabetic Rats

(Histological and Electron Microscopic Study)

Thesis

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بسم الله الرحمن الرحيم

قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَّمْتَنَآ ۖ إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ

صدق الله العظيم

سورة البقرة- الآية 32

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Dedication

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To my son, who is the best gift I've ever had.

To my parents, who have always loved me unconditionally and whose good examples have taught me to work hard for the things that I aspire to achieve.

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CONTENTS

LIST OF ABBREVIATIONS

Abbreviation	Meaning
β	Beta
CT	Connective tissue
DM	Diabetes Mellitus
EGCG	Epigallocatechin gallate
GT	Green tea
H&E	Haematoxylin and Eosin
NOD	Nonobese diabetic mice
PG	Parotid gland
STZ	Streptozotocin

LIST OF FIGURES

Abstract

Background: Diabetes results in a variety of oral health complications. Green tea is a natural antioxidant that had proven to have powerful effects against diabetes.

Aim: To compare between the effect of green tea and insulin on Parotid gland of streptozotocin induced diabetic Albino rats usinglight microscopy and transmission electron microscopy.

Materials and Methods: Forty adult male Albino rats were divided into a control group and diabetic groups. The diabetic group received a single injection of 40 mg/kg of streptozotocin through the tail vein under anaesthesia and was further subdivided into three subgroups: The diabetic untreated subgroup which was left untreated for two weeks, the insulin treated subgroup which received insulin subcutaneously in a daily dose of 5 IU/kg body weight/day for two weeks. Lastly green tea treated subgroup received a daily dose of 1 ml/ 100 gm body weight intragastricallyfortwo weeks. Rats were terminated and parotid glands were dissected and processedfor light and transmission electron microscopic examination.

Results: Histological examination of the diabetic untreated subgroup showed that acinar cells demonstrated

pyknotic and hyperchromatic nuclei with many cytoplasmic vacuolations. Ultrastructurally, acinar cells showed nuclear pleomorphism and dilated rough endoplasmic reticulum and mitochondria. Inflammatory cell infiltration was detected both histologically and ultrastructurally and ducts showed some signs of degeneration with loss of their normal outline and stagnated secretion. However, insulin and green tea treated subgroups showed minimal degenerative changes and were almost similar to the control with minimal changes.

Conclusions: Treatment of the parotid gland of the streptozotocin induced diabetic rats with GT was closely comparable to the traditional insulin in reducing signs of histological and ultrastructural damage.

Introduction

Diabetes Mellitus (DM) is one of the most prevalent, chronic diseases affecting mankind. It is a multistage, complex, chronic metabolic disorder characterized by dysregulation of carbohydrate, protein and lipid metabolism ***(Artion et al., 1998).***

The primary feature of this disorder is elevation in blood glucose levels which has been shown to affect almost all tissues in the body and associated with significant complications of multiple organs including eyes, nerves, kidneys and blood vessels (***Mealey, 2006***).

Insulin is a peptide hormone, produced by beta(β) cells of the pancreas, and is central to regulating carbohydrate and fat metabolism in the body***(Day and Bailey, 1988).***

In addition to treatment of DM by insulin treatment, dietary interventions were shown to represent an effective tool to prevent and/or treat DM (***Willett et al., 2002***).

Green tea (GT), from the plant *Camellia sinensis*, is one of the most popular beverages consumed worldwide. It is rich in antihypertensive, antiarteriosclerotic, hypoglycemic and hypocholesterolemic activity (***Wolfram, 2007***).

The present study will compare the effect of insulin and GT on Streptozotocin (STZ) induced diabetes on the parotid gland (PG) of Albino rats.