## *Dedication*

***I dedicate my work***

***To my parents and my beloved family***

***To my beloved country, Sudan***

***To my university SUST***

***To all my teachers and friends***

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*Thanks first and last to ALLAH who enable me to conduct this study by grace of him and donated strength and patience.*

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# Abstract

A case control study was conducted during the period from April to October 2012 to assess serum levels of thyrotropin(TSH) and thyroxine$T_4$ among sudanese patients with type2 diabetes mellitus. Fifty patients with type2 diabetes mellitus were selected as a test group from the Khartoum Teaching Hospital and Zenam Hospital in Khartoum state ,Sudan. The test group was compared with a control group which included 40 apparently healthy volunteers. Blood specimens were collected from both groups and fasting blood glucose, glycated hemoglobin, thyrotropin and thyroxine were estimated.

Age and gender of the test group were matched with the control group. Spectrophotometeric methods were used for measurement of glucose. Glycated hemoglobin was measured by using chromatographic- spectrophotometric ionexchange method and the thyrotropin and thyroxine measured by Electrochemiluminescent method. Statistical package for social science (SPSS version 11.5) computer software was used for data analysis. The results of this study indicated a significant decrease in the mean of serum levels of thyroxine in test group compared with the control subjects and insignificant deference in the mean of serum levels of thyrotropin. Also there was insignificant deference in the mean of serum levels of thyrotropin and thyroxine in diabetic males compared to diabetic females. There was no correlation between thyrotropin in type2 diabetic patient and fasting blood glucose, glycated hemoglobin and body mass index. Also there was negative correlation between thyroxine in type2 diabetic patient and fasting blood glucose; and no correlation between thyroxine in type2 diabetic patient and glycated hemoglobin and body mass index.

# المستخلص

أجريت دراسة الحالات والشواهد في الفترة مابين ابريل 2012 حتى اكتوبر2012 لتقويم معدلات الثايروتروبين والثايروكسين في مصل المرضى السودانيين المصابين بمرض السكري النوع الثاني. تم إختيار خمسين من المصابين بداء السكر النوع الثاني من مستشفى الخرطوم التعليمي ومستشفى زينام , بولاية الخرطوم (السودان). مجموعة الاختبار قورنت بمجموعة ضابطه تضم اربعين من المتطوعين الأصحاء تم جمع عينات الدم من كلا المجموعتين ومن ثم تم قياس مستوى الجلكوز في حالة الصيام والهيموقلوبين المجلكز و الثايروتروبين والثايروكسين . وفي هذه الدراسة طابقت اعمار وجنس مجموعة الأختبار أعمار وجنس المجموعة الضابطة. تم قياس مستوى الجلكوز في الدم بإستخدام جهاز قياس الضؤ الطيفي وتم إستخدام جهاز NycoCard II لقياس الهيموقلوبين المجلكز وإستخدام جهاز2010 Elecsys لقياس الثايروتروبين والثايروكسين. كما استخدم برنامج الحزمة الأحصائية للعلوم الإجتماعية ( SPSS إصداره 11.5) لتحليل النتائج.نتائج هذه الدراسة آشارت إلى حدوث انخفاض في متوسط مستويات هرمون الثيروكسين فى مصل المرضى فى مجموعة الاختبار مقارنة مع أفراد المجموعة الضابطة ولايوجد إختلاف ذو دلالة إحصائية في متوسط مستويات المصل الثيروتروبين في مجموعة الاختبار مقارنة مع أفراد المجموعة الضابطة. ولايوجد إختلاف ذو دلالة إحصائية في متوسط مستويات المصل من هرمون الثيروكسين والثيروتروبين في الذكور مقارنة بالإناث المصابين بداء السكري.نتائج الدراسة الحالية أشارت إلى عدم وجود علاقة بين الثيروتروبين في مرضى السكري النوع الثاني و مستوى الجلكوز في حالة الصيام, الهيموجلوبين المجلكز ومؤشر كتلة الجسم.وهنالك وجود علاقة سلبية بين هرمون الثيروكسين في مريض السكري النوع الثاني و مستوى الجلكوز في حالة الصيام ، وعدم وجودعلاقة بين هرمون الثيروكسين في مريض السكري النوع الثاني والهيموغلوبين المجلكز ومؤشر كتلة الجسم

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**Abbreviations:**

| **Abbreviations:** | **Name** |
|---|---|
| IDDM | Insulin-Dependent Diabetes Mellitus |
| DKA | Diabetic Ketoacidosis |
| DM | Diabetes Mellitus |
| ECL | ElectroChemiLuminescent |
| FBG | Fasting Blood Glucose |
| $FT_3$ | FreeTtriiodoThyronine |
| FT | Free Thyroxine |
| $FT_4F$ | Free Thyroxine Fraction |
| GDM | Gestational Diabetes mellitus |
| GOD | Glucose Oxidase |
| $H_2O_2$ | Hydrogen Peroxide |
| HAAF | Hypoglycemia-Associated Autonomic Failure |
| Hb $A_1C$ | Glycated Hemoglobin |
| HLA | Human Leukocyte Antigen |
| HNS | Hyperosmolar Nonketotic State |
| MODY | Maturity Onset Diabetes of the Young |
| Ng\dl | Nanograms per Deciliter |
| NIDDM | Non-Insulin-Dependent Diabetes Mellitus |
| pg\d | Picograms per day |
| POD | Peroxidase |
| PTH | ParaThyroid Hormone |
| PTU | Propylthiouracil |
| RAIU | Radioactive Iodine-123 uptake |

| | |
|---|---|
| $rT_3$ | Reverse T3 |
| $T_1DM$ | Diabetes Mellitus Type 1 |
| $T_3$ | TriIodoThyronine |
| $T_4$ | Thyroxin |
| TBG | Thyroxine-Binding Globulin |
| THBR | Thyroid Hormone Binding Ratio |
| TPA | Tripropylamine |
| TPO | Thyroid Peroxidase |
| TRH | Thyrotropin-Releasing Hormone |
| TSH | Thyroid Stimulating Hormone |
| WHO | World Health Organizations |
| Mg | Micrograms |
| μIU/ml | Micro-international unit per milliliter |
| μU/ml | Micro unit per milliliter |