

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قال الله تعالى

قُلْ إِنْ صَلَاتِي وَنُسُكِي وَمَحْيَايَ وَمَمَاتِي لِلَّهِ رَبِّ الْعَالَمِينَ (162)

صدق الله العظيم

سورة الأنعام الآية 162

DEDICATION

To my beloved & pleased parents
whom are every things for me.

To my family members whom
their encouragement

Push me up & up.

To my teachers, very special
friends & colleagues

Who were integral parts of
support group.

I dedicate this work

Acknowledgements

The greatest thank to Allah
then I would like to thank every one
who helps me throughout this work at
any step of it.

Most grateful to my supervisor
Dr. Abdelmula Mohmed Abdalla for his
expertise , support & endless valuable
advice.

Best grated to my Co- supervisor Dr.
Eltayeb Mohamed Ahmed Tayrab for
his support .

I would like to thank the staff of
Clinical Chemistry department, Faculty
of Medical Laboratory Science, Sudan
University of Science & Technology for

their valuable assistance &
encouragement throughout the
research

Finally thanks extend to all
people whom the blood samples had
been collected from.

Abstract

This study was conducted in Khartoum State during the period from April to October 2013; its community based case control study.

Objectives of the study: the main aim of the study is to assess the thyroid hormones among Sudanese smokers in Khartoum State .

Materials and methods : Eighty plasma samples were collected from healthy heavy Sudanese smokers at different ages . In addition to 50 plasma samples from healthy non smokers at different ages for comparison, of thyroid stimulating hormone (TSH) , thyroxine (T4) and tri-iodothyronine (T3) . The level of thyroid hormones in the study was estimated by Omega pathozyne method using Enzyme immunoassay.

Results : the study showed significant increase in thyroxine (T4) , tri-iodothyronine (T3) level in healthy heavy smokers when compared with the control group .(146.8 ± 39.0 versus 96.7 ± 25.4 ng /ml , 2.36 ± 0.76 versus 1.96 ± 0.59 nml/ml respectively) , ($p \leq 0.05$) , with significant decrease in Thyroid stimulating hormone (TSH)

(1.68 ± 1.11 versus 2.21 ± 0.99 μ IU/ml respectively), ($p \leq 0.05$) , The study recorded significant correlation between thyroid hormones and both age and the duration of smoking ($p > 0.05$) .

Conclusion : The study—revealed significant increase in thyroxine (T4) , tri-iodothyronine (T3) with significant decrease in thyroid stimulating hormone (TSH) in healthy smokers.

النتائج

أجريت هذه الدراسة في ولاية الخرطوم خلال الفترة من ابريل الي اكتوبر 2013
الهدف الرئيسي من هذه الدراسة هو قياس هرمونات الغدة الدرقية لدى المدخنين.
تم جمع 80 عينة بلازما من الذكور المدخنين من مختلف الاعمار بالاضافة ال 50
عينة من متطوعين غير مدخنين مماثلين لهم في الاعمار كمجموعة مراقبة لتقدير مستوي هرمونات
الغدة الدرقية في الدم . مستوي الهرمونات في الدراسة تم تقديره عن طريق الاجسام المضادة
وباستخدام مقياس الاليزا.
أظهرت الدراسة ارتفاع مستوي (T4) و مستوي (T3) بالمقارنة مع مجموعات المراقبة
(39±146 م قابل 255±967 0.76±236 ng/ml – 1.96±0.59 nml/ml) على التوالي ($p \leq 0.05$).
أظهرت الدراسة انخفاض في مستوي هرمون (TSH) المحفز للغدة الدرقية (111± 168 م قابل 221±
99 $\mu\text{IU/ml}$) على التوالي ($p \leq 0.05$).
سجلت الدراسة علاقة ارتباط بين العمر والفترة بعد التدخين ($p \leq 0.05$).
هذه الدراسة تستنتج ان هناك ارتفاع في مستوي هرمون (T4) و (T3) مع انخفاض ملحوظ
في هرمون (TSH).

ABBREVIATIONS

TSH : thyroglobulin stimulating hormones

T3 : Tri-iodothyronine

T4 : Thyroxine

G.D : Graves disease

TPO : Thyroid peroxidase

BMI : Body mass index

TSIS : Thyroid stimulating immunoglobulins

RR : Reactive risk

Tg : Thyroglobulin

CVD : Cardiovascular disease

CHD : Coronary heart disease

ED : Erectile dysfunction

SIDS : Sudden infant death syndrome

TMAB : Thyroid microsomal antibody titer

TGAB : Thyroglobulin antibody titer

TBG : Thyroxine - binding globulin

HPA : Hypothalamic pituitary - adrenal

PTH : Parathyroid hormone

SRIH : Somatotropin releasing – inhibitory hormone

TRH : Thyroid releasing hormone

NO : Nitric oxide

HDLc : High density lipoprotein cholesterol

LDLc : Low density Lipoprotein cholesterol

PAHs : Polycyclic aromatic hydrocarbons

PAP : Peripheral arterial pressure

ACE : Antigen – converting enzyme

MI : Myocardial infarction

PAD : Peripheral arterial disease

Contents

No.	Content	Page
	Title page	I
	الإهداء	II
	Dedication	III
	Acknowledgements	IV
	Abstract	V
	مستخلص البحث	VI
	Abbreviations	VII
	List of contents	IX
	List of tables	XIII
	List of figures	XIV
Chapter one Introduction & literature review		
1.1	Introduction and Literature Review	1
1.2	History	2
2.1.1.	Smoking	2
2.1.1.1	Epidemiolog & Prevalence	3
2.1.2.	Health effects of cigarettes	5
2.1.2.1.	Coronary heart disease	5
2.1.3.	Cigarettes smoked per day	6
2.1.3.1	Duration of smoking	6
2.1.3.2	Smoking cessation	7
2.1.3.3.	Race and ethnicity	8
2.1.3.4.	Sudden death	8
2.1.3.4.1	Stroke	9
2.1.3.4.2.	Aortic aneurism	9

2.1.3.4.3.	Peripheral arterial disease	10
2.1.4.	Pathophysiology	10
2.1.4.1.	Cigarette smoke constituents	10
2.1.4.2.	Mechanisms	13
2.1.4 .3.	Nitric oxide	15
2.1.4.4.	Inflammation	15
2.1.5.	Thyroid gland	16
2.1.5.1.	Thyroid physiology	16
2.1.5.2.	T3 & T4 Production and action	19
2.1.5.3.	T3& T4 Regulation	20
2.1.5.4.	Calcitonin	21
2.2.	Thyroid disorders	21
2.2.1.	Hyperthyroidism	21
2.2.2.	Symptoms & signs of hyperthyroidism	22
2.2.3.	Thyroid storm	23
2.2.4.	Hypothyroidism	24
2.2.4.1.	Classification of hypothyroidism	24
2.2.4.2.	Primary hypothyroidism	24
2.2.4.3.	Secondary hypothyroidism	24
2.2.4.4.	Tertiary hypothyroidism	24
2.2.4.5	Signs & symptoms of hypothyroidism	24
2.2.4.6.	Early & Late signs & symptoms of hypothyrodsm	25
2.2.4.7.	Uncommon signs & symptoms	26
2.2.4.8.	Subclinical hypothyroidism	26
2.2.4.9.	Causes of subclinical hypothyroidism	27
2.2.4.10.	Stress & hypothyroidism	28

2.3.1	Diagnosis of thyroid disorder	28
2.3.3.	Diagnosis of hyperthyroidism	29
2.3.4.	Diagnosis of hypothyroidism	30
2.4.	Background study	35
Chapter two Material and methods		
3.1	Materials & Methods	39
3.2.	Study approach	39
3.3.	Study design	39
3.4.	Study population	39
3.5.	Selection criteria	39
3.6.	Study variables	39
3.7.	Sample size	39
3.8.	Tool of data collection	40
3.9.	Sample processing	41
3.10.	Materials	41
3.11.	Methods	41
3.12.	Quality control	43
3.13	Data analysis	43
	Chapter three Result	
4	Results	44
	Chapter four Discussion, conclusion, and recommendation	
5.1	Discusion	49
5.2	Conclusion	50
5.3	Recommendations	51
	References	52
	Appenendixes	53

List of Tables		
Table	Title	Page
1.2.	Thyroid test description and utility	31
1.3.	Diagnostic indicators of thyroid diseases	33

1.4.	Normal range of thyroid function tests	34
4.3.	Comparison of Thyroid stimulating hormones (TSH) in healthy heavy Sudanese smoker compared with that of the control group	47
4.4.	Comparison of Thyroxine (T4) in healthy heavy Sudanese smoker compared with that of the control group	47
4.5.	Comparison of Tri-iodothyronine (T3) in healthy heavy Sudanese smoker compared with that of the control group	48
4.6.	Correlation of Thyroid hormones in healthy heavy Sudanese smokers with age and duration of smoking	49

List of Figures

Figure	Title	Page
1.1	Overview of mechanism by which cigarette smoking causes an acute cardiovascular event	14
1.2	The system of the thyroid hormones T3 and T4	18
1.3	Synthesis of the thyroid hormones.	18
4.1	Serum Thyroxine level in test group and their control.	45
4.2	Serum Tri-iodothyronine level in test group and their control.	46