

DEDICATION

To My Parents, Husband and my Kids

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CONTENTS

DEDICATION.....	i
ACKNOWLEDGEMENTS.....	ii
TABLE OF CONTENTS.....	iii
LIST OF FIGURES.....	vi
LIST OF TABLES.....	viii
ABSTRACT.....	ix
ABSTRACT (ARABIC).....	x

Chapter One: Introduction

1.1 Introduction.....	1
1.2 Risk associated with CT radiation exposure.....	4
1.3 Dose Management (optimization).....	7
1.4 Statement of the problem.....	7
1.5 Objectives of the study.....	8
1.6 Thesis Outlines.....	8

Chapter Two: Theoretical Background

2.1 Scientific background and early technical development.....	10
2.1.1 Computed Tomography.....	10
2.2 Basic Principles of CT.....	11
2.3 Historical development.....	15
2.3.1 CT Generations.....	17

2.3.1.1	First-Generation CT Scanners.....	17
2.3.1.2	Second-Generation CT Scanners.....	18
2.3.1.3	Third-Generation CT Scanners.....	19
2.3.1.4	Fourth-Generation CT Scanners.....	21
2.4	Principles of Helical CT Scanners.....	23
2.5	Slip-Ring Technology.....	24
2.6	Capabilities of Single-Row Detector Helical CT.....	25
2.7	Multiple-Row Detector Helical CT.....	26
2.8	The CT scanner components.....	30
2.9	Radiation dose standards and measurements.....	32
2.9.1	General Definitions.....	32
2.9.2	Radiation dose in CT.....	33
2.10	Scan parameters.....	36
2.10.1	Tube Potential (kVp).....	36
2.10.2	Tube Current – Time Product (mAs).....	36
2.10.3	Slice thickness.....	37
2.10.4	Pitch.....	37
2.10.5	Gantry rotation time.....	37
2.11	Factors affecting radiation dose	38
2.11.1	CT scanner design factors	38
2.12	CT chest technique.....	38
2.13	Optimization strategy.....	39

2.13.1	Reduction of Tube Voltage.....	39
2.14	Previous studies.....	40

Chapter Three: Materials and Methods

3.1	Introduction.....	47
3.2	64 Slice CT scanner.....	47
3.3	Patient Data.....	48
3.4	CT Chest procedure.....	48
3.5	Measuring CT radiation dose.....	49
3.6	Organ dose determinations.....	49
3.7	CT dose optimization strategies steps	49
3.8	Calculation of Effective dose	49
3.9	Cancer risk estimation.....	51
3.10	Analysis of data.....	52

Chapter Four: Results..... 53

Chapter Five: Discussion

5.1	Discussion.....	60
5.2	Conclusion.....	66
5.3	Recommendations.....	67
5.4	Future studies.....	68

References..... 69

Appendix A

List of Figures

Fig (1.1)	Evolution of the medical radiation exposure (1980-2006).	3
Fig (1-2)	Contribution of CT to medical radiation	5
Fig(2.1)	Sample CT image.	11
Fig (2.2)	Principles of CT.	14
Fig (2.3)	The first clinical scan: Atkinson Morley's Hospital.	17
Fig (2.4)	Diagram of the first-generation CT scanner.	18
Fig (2.5)	Diagram of the second-generation CT scanner.	19
Fig (2.6)	Diagram of the third-generation CT scanner.	
Fig (2.7)	Diagram of the fourth-generation CT scanner.	22
Fig (2.8)	Reconstruction image of early 3D images.	23
Fig (2.9)	Principles of helical CT.	24
Fig (2.10)	Diagram of the slip-ring configuration.	25
Fig (2.11)	Time line of the key Technological.	25
Fig (2.12)	Diagram shows the difference between S-R detector and M-R detector CT designs.	27
Fig (2-13)	Various detector array designs used in multiple-row detector CT scanners.	28
Fig (2-14)	Single CT detector versus Multi slice CT detector.	30
Fig(2.15)	Dose Quantities and units.	33
Fig (3.1)	Mathematical Phantom used for NRPB –Monte Carlo simulations.	50

Fig (4.1)	Comparison of patients demographic data of both groups	57
Fig (4.2)	comparison between radiation dose parameters for both groups	58
Fig(4.3)	cancer risk probability in most sensitive organ, Comparison between group (A) and group(B)	59

List of Tables

Table(4.1)	Demographic data of patient for both groups: mean and the range in the parenthesis	55
Table(4.2)	Clinical scan parameters	55
Table(4.3)	Dose Parameters	56
Table(4.4)	Risk Estimation for Control (A)	57
Table(4.5)	Risk Estimation for Optimize (B)	58
Table(5.2)	Comparison between CT chest in different modalities.	64
Table(5.3)	Checklist for CT Dose Optimization	65

ABSTRACT

Computed tomography (CT) examinations can involve relatively high doses to patients. The doses can often approach or exceed levels known with certainty to increase the probability of cancer. Therefore, optimisation of patient dose is crucial. The objectives of this study were to: (i) measure the radiation dose for patient during 64 slices CT Chest scan, (ii) optimize the radiation dose and (iii) estimate the lifetime attributable to risk of cancer.

A total of 50 patient divided into two groups one as control group (A) (38 patients) and optimization group (B) (12 patients). Group A were performed with the own department protocol using 64 slice CT Scan (Toshiba, Aquilion) in Al-Amal national Hospital, Khartoum North, and group (B) the optimized group were performed by the optimized technique increasing the pitch factor. Data were collected to study the effects of patient-related parameters, exposure-related parameters. The organ dose conversion factor $f(\text{organ}, z)$ was obtained from the NRPB datasets (NRPB-SR279) based on the Monte Carlo simulations.

The mean CTDI_{vol} was 21.17 mGy and DLP was 839 mGy.cm for group A and CTDI_{vol} was 8.3 mGy and DLP was 239.67 in group (B). The effective dose for group A was 14.6 mSv and for group B was 5.7 mSv. The probability of overall cancer risk was estimated to be 267 per million The relative high dose in group(A) may be due to many factors such as operators and practitioners are insufficiently educated in newly emerging technology, or patient related factors. The mean organ doses in this study were mostly comparable (group B) to and slightly higher (group A) than reported values from the developed countries. Proper justification of examinations, use of the appropriate technical parameters during examinations, proper quality control, and application of diagnostic reference levels of dose as appropriate would reduce the patient radiation during CT examination

الخلاصة

تساهم الأشعة المقطعية بجرعات اشعاعية عالية للمرضى . الجرعات عادة ما تصل او تزيد عن الحد المعروف , بحدوث زيادة فى احتمال الاصابة بالسرطان . و بالتالى ضبط الجرعة الاشعاعية للمرضى من الاهمية بمكان . هدفت هذه الدراسة الى قياس الجرعة الاشعاعية للمرضى اثناء فحص الصدر باستخدام جهاز الأشعة المقطعية ذو الاربعة و ستون شريحة و ضبط الجرعة الاشعاعية و تقدير الخطر الاشعاعى المصاحب.

عينة من 50 مريض تم تقسيمهم الى قسمين :عينة مرجعية (38 مريض) و تعرف بالمجموعة (ا) , و عينة ضبط(12 مريض) عرفت بالمجموعة(ب) . المجموعة(ا) خضعت للفحص بالبروتوكول المتبع بقسم الأشعة باستخدام جهاز توشيبا اكلويون ذو الاربعة و ستون شريحة بمستشفى الامل الوطنى ببحرى. تم جمع البيانات ذات الصلة بالمرضى و قياس الجرعة باستخدام جامع بيانات. تم حساب جرعة الاعضاء باستخدام معاملات التحويل من برنامج NRPB 279 يعتمد على محاكاة برنامج مونت كارلو . بلغ متوسط الجرعة الحجمية 21.17 مللى غرى و8.3 مللى غرى ومعامل الجرعة لوحدة الطول 839 و 239 مللى غرى سم للمجموعتين (ا) و(ب) على الترتيب. بلغت قيمة الجرعة المؤثرة للمجموعة (ا) 14.6 مللى سيفرت و للمجموعة (ب) 5.7 مللى سيفرت .بلغ متوسط احتمال الاصابة بالسرطان 267 حالة لكل مليون فحص. تعزى الجرعة العالية للمجموعة (ا) الى عدة عوامل: التقنى , الممارسين الذين ليس لديهم الالمام الكافى بضبط الجرعة لهذه التقنية الحديثة او العوامل ذات الصلة بالمريض. متوسط الجرعة للمجموعة (ب) شبيه بمثله فى الدراسات السابقة بينما الجرعة للمجموعة (ا) اعلى من مثيلاتها فى الدول المتقدمة. التبرير الامثل للفحص استخدام عوامل تصوير مناسبة اثناء الفحص , ضبط جودة الاجهزة و تطبيق مبدا الجرعة المثلى المرجعية كلها عوامل سوف تسهم فى خفض الجرعة الاشعاعية للمرضى اثناءالفحص باستخدام الأشعة المقطعية.