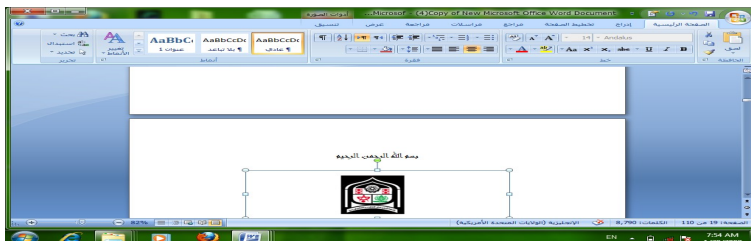


بسم الله الرحمن الرحيم



Sudan University of Science and Technology
College of Graduate Studies

Estimation of Entrance Skin Dose (ESD) for Pediatric Patients During Chest X-ray Examinations in Omdurman Military Hospital

تقدير الجرعة الإشعاعية السطحية للأطفال خلال فحوصات الصدر باستخدام الأشعة
السينية بمستشفى السلاح الطبي بامدرمان

*A research submitted for partial fulfillment of the requirements for
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الآية

: قال تعالى

خَلَقَكُمْ مِنْ نَفْسٍ وَاحِدَةٍ ثُمَّ جَعَلَ مِنْهَا زَوْجَهَا وَأَنزَلَ لَكُمْ مِنْ الْأَنْعَامِ (ثَمَانِيَةَ أَزْوَاجٍ يَخْلُقْكُمْ فِي بُطُونِ أُمَّهَاتِكُمْ خَلْقًا مِنْ بَعْدِ خَلْقٍ فِي ظُلُمَاتٍ (ثَلَاثِ ذَلِكُمُ اللَّهُ رَبُّكُمْ لَهُ الْمُلْكُ لَا إِلَهَ إِلَّا هُوَ فَأَنَّى تُصْرَفُونَ

صدق الله العظيم
(الزمر الآية 6)

Dedication

I would like to dedicate my humble effort to my beloved parents. Thanks for their valuable sacrifices, love and support.

I would like also to dedicate this paper to my life-long companions; my dear sisters and brothers
I would like to dedicate my work to my awe some colleagues.

Acknowledgement

First and foremost, I would like to express my gratitude to my Creator (Subuhanhuwa Ta' Alla), who reconciled me to bring this research into being.

I would like to express my regards and gratefulness for my supervisor: Dr / Awadh Abd Allah Adlan for his guidance, encouragement, cooperation and supervision of this work.

Thank all

Abstract

The aim of this study was to estimate the Entrance Skin Dose (ESD) received from chest X-ray examinations in pediatric patients. The study was conducted in the Military Hospital at Omdurman. 64 patients were included in the study and were classified into five age groups (>1 year), (1-5 years), (5-10 years), (10-15 years) and (15 years). Calculations were performed using exposure factors, KVp, mAS and FSD, together with patient data (age, height in cm., and weight in Kg.). Two examination projections have been investigated, namely Antero-posterior (AP) and postero-anterior (PA). The ESD values were calculated, analyzed using statistical analysis methods and compared with International dose references. The ESD was determined by using the equation :

$$ESD = c \left(\frac{kvp}{FSD} \right)^2 \times \left(\frac{mAS}{AL} \right)$$

The Entrance Skin Dose was found to be, 60 µGy for children up to 1 year, 60 µGy for (1-5) years, 120 µGy for (5-10) years and 150 µGy for (10-15) years old children. These values are within the International reference levels and it has been found that the ESD increases with the age & the

increase in exposure parameters Kvp and mAs . The researcher recommended that all x-ray equipment should be regularly checked and quality control tests should be done and standardized, specially the exposure parameters in pediatric imaging to reduce doses because the pediatrics are more sensitive to radiation than adults .

مخلص البحث

تهدف هذه الدراسة إلى تقدير الجرعة الإشعاعية السطحية للأطفال الذين يخضعون لفحوصات الكشف الإشعاعي للصدر وقد أجريت هذه الدراسة في مستشفى السلاح الطبي بامدرمان . شملت هذه الدراسة 64 مريض تم تصنيفهم الى خمس فئات عمرية هي (اقل من سنة), (1- 5 سنة) , (5<10 سنة) , (10<15 سنة) و (15 سنة).

وتم تسجيل عوامل التعريض المناسبة لجميع المرضى- و لكل وضعية من الوضعيتين المستخدمتين في الدراسة و هي (فرق الجهد ومضروب تيار الأنبوب في زمن التعريض وتحديد بؤرة الأنبوب من الفليم) اضافة الى جمع البيانات التي تتعلق بالمريض (النوع, العمر , الطول بالسنتيمتر و الوزن بالكيلوجرام) ومن ثم حساب الجرعات الإشعاعية لكل صور الأشعة المأخوذة للصدر بالوضعيتين الأمامية الخلفية

(AP) و الخلفية الأمامية (PA) . وقد تم حساب قيم الجرعات الإشعاعية السطحية

باستخدام المعادلة: $ESD = c (kvp / FSD)^2 \times (mAs / AL)$

وقد جاءت كما يلي 60μGy للأطفال اقل من سنة , 60μGy من عمر 1-5μGy 120 (ومن عمر 5-10) و 150 μGy من عمر 10 - 15 سنة ومن نتائج الدراسة وجد أن الجرعة تزداد بازدياد العمر وكذلك تزداد مع Kvp و mAs وعند مقارنتها بالجرعات

القياسية العالمية وجد أن الجرعة الإشعاعية السطحية للجلد ESD تقع ضمن المدى المسموح به عالميا وقد أوصى- الباحث بعمل اختبارات دورية منتظمة على جميع أجهزة الأشعة وتوحيد عوامل التعريض لتقليل الجرعة الإشعاعية للأطفال لفرط حساسيتهم للإشعاع مقارنة بالكبار.

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