

Sudan University of Science and Technology

College of Graduate Studies



**Effective dose estimation during pediatric chest X ray
radiography**

تقدير الجرعة المؤثرة للأطفال في فحص الصدر

*A thesis submitted in partial fulfillment for the requirements
of Master degree in Medical Physics*

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Dedication

To:

My parent for their patience and encouragement

My brothers, sisters and teachers for their help and support

My friends for their valuable supports

I dedicate this work

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Abstract:

Radiation doses to patients from chest X ray radiography which is the most common paediatric X-ray examinations were studied in two hospitals (MO) and (IB) in Khartoum state, Sudan. Entrance surface dose (ESD) was determined from exposure settings using DosCal software. Totally, 126 patients were included in this study. Mean ESDs obtained from for pediatric chest radiography in (MO) hospital recorded in this work was 0.049, 0.058, 0.100 and 0.054 mGy for the patients aged between 0-1, 1-3, 3-5 years and total sample respectively, and was 0.031 mGy for aged group in (IB) hospital .

The mean ESDs per chest radiographic image ranged between 0.054 and 0.031 mGy in (Mo) and (IB) respectively per exposure, which is slightly lower than the corresponding values reported in the DRLs reported in European guidelines on quality criteria for diagnostic radiographic images EUR 16260EN As demonstrated in the discussion, patients' doses were high in departments using single-phase generators compared with those using constant potential. The results presented will serve as a baseline data needed for deriving reference doses for pediatrics X-ray examinations in Sudan. The mean organ equivalent dose assessed from ESDs measured values for (MO) and (IB) using CHILDOSE (NRPB-SR279) to lung, breast, thyroid, liver, kidney , bladder, stomach and testis was 0.021, 0.039, 0.026, 0.013, 0.002, 0.006, 0.0013 and 0.00001 mSv for (MO) , 0.0120, 0.0293, 0.0149, 0.0076, 0.012, 0.0034, 0.074 and 0.0000076 mSv for (IB) respectively. The overall effective dose obtained from this study 0.0092 and 0.0053 mSv for (MO) and (IB) respectively.

المخلص

الاستخدام الطبي للأشعة السينية هو من اكبر مصادر تعرض الانسان للأشعاع في الوقت الحاضر. لذلك يجب تجنب استخدام الأشعاع بصورة مفرطة او بجرعات اعلي مما هو مطلوب لعمل الفحص المحدد. مؤخرًا، زاد الاهتمام بمخاطر الأشعاع وخاصة السرطان نتيجة للتعرض الطبي للأشعاع.

هدفت هذه الدراسة الي قياس الجرعة الاشعاعية للمرضي اثناء فحوصات الاشعة العادية لمستشفيات بولاية الخرطوم. لتقدير الجرعة المكافئة للأعضاء المختلفة وكذلك الجرعة المكافئة وتقدير خطر الأشعاع الناجم عن فحوصات الصدر للأطفال بواسطة الأشعة السينية . قيست الجرعة الاشعاعية باستخدام جهاز انفورس (Unfors).

تم قياس جرعة الاشعاع لعدد 126 مريض في كل من المستشفيات الآتية: محمد الامين – ام درمان و مستشفى جعفر ابنعوف للأطفال .

خلصت هذه الدراسة الى ان الجرعات الاشعاعية للمرضي متقاربة مع الدراسات السابقة. هذه الدراسة توفر معلومات اساسية عن مستوي الجرعات الاشعاعية للمرضي بهذه المستشفيات. لوحظ ان هناك اختلاف كبير بين قيم الجرعات الاشعاعية للفحص الواحد. يعزي ذلك لاختلاف الاجهزة وطريقة الفحص بالاضافة الي كفاءة تقني الأشعة ووزن المريض . هذه الدراسة تؤكد علي اهمية برنامج ضبط جودة فعال في هذه المستشفيات ووضع مستويات مرجعية للأشعاع .