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requirement

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Estimation of Patient Radiation Dose During

Digital Radiography Examinations

تقدير الجرعة الاشعاعية للمرضى خلال فحوصات

التصوير الرقمي

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-: قال تعالى

﴿اللَّهُ نُورُ السَّمَاوَاتِ وَالْأَرْضِ مَثَلُ نُورِهِ كَمِشْكَاةٍ فِيهَا مِصْبَاحٌ الْمِصْبَاحُ فِي زُجَاجَةٍ الزُّجَاجَةُ كَأَنَّهَا كَوْكَبٌ دُرِّيٌّ يُوقَدُ مِنْ شَجَرَةٍ مُبَارَكَةٍ زَيْتُونَةٍ لَّا شَرْقِيَّةٍ وَلَا غَرْبِيَّةٍ يَكَادُ زَيْتُهَا يُضِيءُ وَلَوْ لَمْ تَمْسَسْهُ نَارٌ نُورٌ عَلَى نُورٍ يَهْدِي اللَّهُ لِنُورِهِ مَنْ يَشَاءُ وَيَضْرِبُ اللَّهُ الْأَمْثَالَ لِلنَّاسِ وَاللَّهُ بِكُلِّ شَيْءٍ عَلِيمٌ﴾
سورة النور الآية ﴿35﴾

﴿وَيَسْأَلُونَكَ عَنِ الرُّوحِ قُلِ الرُّوحُ مِنْ أَمْرِ رَبِّي وَمَا أُوتِيتُمْ مِنَ الْعِلْمِ إِلَّا قَلِيلًا﴾

سورة الإسراء الآية ﴿85﴾

Dedication

This thesis is dedicated to my parents

For their endless love, support, encouragement and prayers
of day and night make me able to get such success and
honor.

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Abstract:

Diagnostic X-rays are useful in detecting abnormalities within the body, the digital x-ray is the advance modality of x-ray machines. Most clinical examination of the radiological field only take in account the image quality without taking care about dose receive by the patient .These study aimed to estimate the entrance skin doses and effective doses for adult patients underwent chest digital x-ray PA and lumbar spine (AP,LAT) examination using mathematical relation between output and entrance skin dose(ESD). The data was collected in two hospitals (MMC & RICK) in Khartoum state with average load 30,20 case per day respectively.

82 patients were examined in this study, 42 for chest and 40 for lumbar AP&LAT, the data collected was include height, weight, age of patients, kilovoltage (kVp) , tube current (mAs), and focus to skin distance (FSD) settings. These data was used to calculate ESD and effective doses (ED).

The mean ESD and ED of three examinations were (0.216 ± 0.072) , (3.869 ± 1.09) and (4.695 ± 1.07) mGy and mean ED were (0.036) , (0.53) and (0.194) mSv for chest PA, lumbar spine AP, and LAT respectively. These values were compared with those of published works and international established diagnostic reference levels. The variation of ESD was found to be 53% lower while ED was found to be 47% higher compared with values of (UNSCEAR 2000) these refer to techniques used for the examinations studied, the importance of establishing a national quality assurance program and examination protocols to ensure that patient doses are kept as Low as possible..

:الملخص

تعتبر التصوير بالأشعة السينية من انجح وسائل التشخيص والتصوير الرقوى هى احدث طريقة تصوير بأشعة اكس ومن الملاحظ ان تقنىى الأشعة تصب تركيزهم فى جودة الصورة ويجهلون الجرعة الاشعاعية للمريض لذلك هدفت هذه الدراسة الى تقييم التعرض الإشعاعية المرضى البالغين في فحص الأشعة السينية للصدر والظهر باستخدام معادلة رياضية وكذلك الجرعة المؤثرة. وقد اجريت هذه الدراسة في كل من المركز الطبي الحديث ومركز الخرطوم للعلاج بالأشعة في الخرطوم.

وقد شملت فحص 82 مريض وتم تضمين بياناتهم (الطول - العمر- الوزن- النوع) وايضاجهدالتسريع وتيلر الأنبوب والزمن والمسافة بين السطح والانبوب في النتائج .

ووجدان متوسط جرعة السطح لمرضى الصدر تساوى (0.072 ± 0.216) مللى قراي والجرعة المؤثرة تساوى 0.036 مللى سيفرت و (1.09 ± 3.869) مللى قراي لمرضى الظهر من الامام للخلف مع متوسط جرعة مؤثرة تساوى (0.53) مللى سيفرت و (1.07 ± 4.695) مللى قراي لمرضى الظهر من الجانب بجرعة مؤثرة تساوى 0.194 مللى سيفرت.

وتم مقلنتها بنتائج مراسات سابقة في نفس المجال ووجد ان جرعة السطح اقل بنسبة 53% والجرعة المؤثرة اعلى بنسبة 47% وان الاختلاف البسيط في جرعات المرضى يعود الى الاختلاف في استخدام التقنيات والتي تشير اهمية تأسيس برنامج تأكيد الجودة وبروتوكولات الفحص الاشعاعي للتأكد من أن جرعة المريض محفوظة اقل ما يمكن.

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<p style="text-align: center;">List of abbreviation</p> <p>ICRU International Commission for Radiological Units</p>		

NRPB	National Radiation Protection Board
DR	Digital Radiography
IAEA	International Atomic Energy Agency
HPGe	High Purity Germanium
CR	Computed Radiography
SPD	Stimulable Phosphor Detector
SNR	Signal to Noise Ratio
DQE	Detective Quantum Efficiency
IR	Ionizing Radiation
RAD	Radiation Absorbed Dose
ICRP	international Commission for Radiation Protection
RICK	Radiation Isotopes Center of Khartoum
MMC	Modern Medical Center
BSF	Backscatter Factor
AP	Anterior Posterior
PA	Posterior Anterior
LAT	Lateral
FSD	Focus to Skin Distance
ISL	Inverse Square Law
ESD	Entrance Skin Dose
ED	Effective Dose

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