

Dedicate

...Few steps between what over and what will come

....I dedicate this work to my ambition

*:With faith by god
Nada Ahmed*

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ABBREVIATION

ALI	Annual limits of radionuclide intake
AP	Anterior Posterior
BMI	Body Mass Index
CF	correction factor
DNA	Deoxy Nucleic Acid
Hz	Hertz
IAEA	International Atomic Energy Agency
ICRP	International Commission of Radiation Protection
kV	kilo volt
mA	milli Ampere
MBq	Mega Becquerel
MDP	methylene diphosphonate
MeV	mega electron volt
mGy	milli Gray
MIRD	Medical Internal Radiation Dose
mSv	milli sievert
N.C	Al-Nailen medical diagnostic Center
PA	Posterior Anterior
PMT	Photo multiplier tube
RBE	Relative Biological Effectiveness
TLDs	Thermoluminescence Dosimeters

Abstract

Although bone scan is widely used as a frequent screening test; imaging of the skeleton using radioactive substances in Sudan using radio active substance in form of radiopharmaceuticals, standing to our knowledge, there are no studies aimed to evaluate the radiation doses to the staff due to performing these types of procedures; thus this study is consider a bonier in Sudan. The study aimed to evaluate the radiation doses received by the nuclear medicine staff during the whole body bone scan procedure and to estimate the organ doses during the entire procedures.

The following study was carried out a 5 *mCi* of ^{99m}Tc -MDP follow intravenous injection and accumulated in bone rapidly. Anterior and posterior data acquisition achieved using MiE single head gamma camera. The study concerned on Three nuclear medicine staff with average 25 year, 77 kg weight, 177 cm height and 0.0024 BMI, positioned TLDs over their right hand and chest. The mean chest and hand doses for the three adult staff were 64.4 *mGy*, 6.3 *mGy* respectively. The staff organ doses received by the lung, bone marrow, colon and stomach were of magnitude of 0.77 *mSv*, and the skin dose is equal 0.032 *mSv*, hence only 15.4 *mSv* is received by the staffs' organ what is within the acceptable 50 *mSv* annual organ dose limit determined by ICRP. It had been observed that, chest doses was higher than hand doses because of direct handling with the injected patient and leaning the patient during submitting to scanning procedure. Increasing of staff and co-patient awareness about radiation safety and wearing lead apron inside any controlled area is recommended to enhance radiation protection in Al-Nilen diagnostic center.

ملخص البحث

بارغم من أن مسح الهيكل العظمي باستخدام المواد المشعة الصيدلانية يعتبر الأكثر شيوعاً في مجال الطب النووي في السودان؛ إلى أنه على حد العلم لا تتوفر دراسة هدفت إلى تقويم الجرعات التي يتلقاها العاملين في المجال و تقدير الخطر من التعرض لمثل هذه الأشعاعات.

هدفت الدراسة لتقويم الجرعات الإشعاعية المتلقاة من قبل العاملين في مجال الطب النووي أثناء فحوصات مسح العظام، بصدد تقدير الجرعات للأعضاء الداخلية. في هذه الدراسة 5 ملي كوري من التكنيشيوم الغير مستقر حقنت عبر الوريد و تجمعت في العظام، تحصلت الدراسة على الصور الأمامية و الخلفية للهيكل العظمي بواسطة ماسح القاما كاميرا أحادي الرأس. استهدفت الدراسة ثلاث عاملين في مركز النيلين التشخيصي بتوسط أعمار 25 سنة ، و متوسط أوزان 77 كيلو جرام و متوسط أطوال 177 سم ، و متوسط معامل كتلة الجسم 0,0024 . الجرعة للصدر و اليد للعاملين كانت 64,4 و 6,3 ملي غراي على التوالي. تلقت كل من الرئة و نخاع العظم و المعدة جرعة سعتها 0,77 ملي سيفرت و الجرعة للجلد 0,032 ملي سيفرت؛ ذلك أن فقط 15,4 ملي سيفرت تتلقاها الأعضاء الداخلية للعاملين تقع ضمن الحدود السنوية (500 ملي سيفرت للأعضاء الداخلية) التي نصت عليها اللجنة الدولية للوقاية من الإشعاع.

لوحظ من الدراسة أن الجرعة للصدر أعلى من الجرعة لليد و بالتالي الأعضاء الداخلية الواقعة أسفل الصدر ؛ فسر ذلك بسبب استناد المريض على العامل قبل استلقائه على طاولة التصوير؛ لهذا اقترحت الدراسة برامج تثقيفية متطورة في مجال الوقاية من الإشعاع و الخطر الإشعاعي بالإضافة إلى ضرورة ارتداء ملابس رصاصية واقية من الإشعاع عند التواجد داخل مناطق الإشعاع لتطوير الوقاية من الإشعاع في مركز النيلين التشخيصي.