

# Dedication

- *To the Soul of my dear and beloved father*
- *To my mother, sisters, brothers, wife, my son  
Mohammed, my great teachers*
- *My students past present and future  
researchers.*

# Acknowledgements

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## **List of abbreviations**

**(Alphabetical order)**

DAP:	Dose Area Product
DRL:	Dose reference Level
E :	Effective dose
ECF:	Element correction factor
ESD:	Entrance Surface Dose
IAEA:	International Atomic Energy Agency
ICRP:	International commission on radiological protection
Gy:	Gray SI unit of absorbed dose
kV:	Kilo voltage
SV:	Sievert
BMI :	Body mass index
HSG	Hysterosalpingography
IM :	Intramedullary nailing
DHS :	Dynamic hip screw
DCS :	Dynamic cannulated screw
ERCP :	Endoscopic retrograde cholangiopancreatography
TLD :	Thermo luminescence Dosimeter

## Abstract

The main objective of this study is to evaluate the radiation dose incurred by medical staff and patients during orthopedic procedures, namely dynamic hip screw (DHS), dynamic cannulated screw (DCS) and closed intramedullary nailing (IMN). The entrance skin dose (ESD) for both staff and patients at different anatomic locations was measured using lithium fluoride (LiF: Mg, P,Cu GR: 200) thermoluminescence dosimeters (TLDs) and TLD reader (Fimel-France). The ambient dose around C-arm machine was also measured using CONYII ionization chamber. The mean values of fluoroscopic exposure factors for the procedures were  $71 \pm 7$  kVp,  $1.3 \pm 0.6$  mA and  $0.68 \pm 0.13$  min. The mean ESD was 0.26 and 7.9 mGy for staff and patient, respectively. On the average, the ESD for staff at specific anatomic locations was  $0.15 \pm 0.02$  (lens),  $0.064 \pm 0.01$  (thyroid),  $0.20 \pm 0.06$  (chest),  $0.23 \pm 0.2$  (right hand) and  $0.19 \pm 0.04$  mGy for the left leg. The results revealed that staff and patients received higher radiation doses during DHS relative to DCS procedures; and that the orthopedist hands were most exposed than other organs.



## المخلص

الهدف الاساسي من الدراسة الحالية هو تقييم جرعة الأشعة خلال الممارسة لجراحي العظام وذلك اثناء جراحة عنق عظمة الفخذ وجراحة عظمة الفخذ وعملية جراحة زرع المسمار الداخلي المغلق. تم استخدام عدد 110 شريحة مقياس وميضي حراري مضبوطة من نوع فلوريد الليثيوم المنشط بعناصر الماغنيسيوم والفسفور والنحاس والمعروف باسم (جي ار 200) والتي تمت قراءتها باستخدام قاري وميضي حراري مضبوط من نوع (فيمل فرنسي). تم قياس جرعة الأشعة للعاملين والمرضى في عدة مواضع تشريحية. ايضا تم قياس التعرض الإشعاعي حول اجهزة الأشعة المستخدمة والتي هي في شكل C باستخدام غرفة تأين مضبوطة . كان متوسط عوامل التعريض للفحوصات هي  $7 \pm 71$  كيلوفولت ،  $0,6 \pm 1,3$  ملي امبير،  $0,13 \pm 0,68$  دقيقة . وكان متوسط الجرعة السطحية للجلد للعاملين والمرضى  $7,9$  و  $0,26$  ملي قراي علي التتابع . وكان متوسط جرعة الأشعة في المناطق التشريحية المختلفة للعاملين هي  $15,0 \pm 2$  لعدسة العين  $0,01 \pm 0,064$  للغدة الدرقية ،  $0,06 \pm 0,2$  للصدر ،  $0,2 \pm 0,23$  لليد اليمني و  $0,19 \pm 0,04$  ملي قري للرجل اليسري . استنتجت الدراسة ان يد الجراح تتعرض لجرعة اشعاعية اعلي من المناطق التشريحية الأخرى . وان التداخل الاشعاعي في جراحة عنق الفخذ تنتج عنه جرعة اشعاعية اعلي من جرعة التداخل اثناء فحص عظمة الفخذ بالنسبة للمرضى والعاملين.