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INVESTIGATION OF ENTRANCE DOSE DETERMINATION AND EFFICIENT DOSE CALCULATION IN CHEST AND SKULL RADIOGRAPHIES

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ABSTRACT

The study's goal was to find out the admission surface amount (ESD), maximum effective dose (ED), organ administer the dose, and regional dose rates throughout three general medical centers using a common screening via radiography tests. Over the course of six months, radiological machines and four via radiography views were used to gather data from 110 patients. Studies showed that changes in mAs and kVp were strongly linked to changes in ED and ESD morals. The overall mean ESD was smaller than the suggested DRLs, but the ED estimated was higher than that of the other research. We use findings from the research to find the best dose levels for patients.

"**Keywords:** Patient radiation dose, radiography, effective dose, entrance surface dose".

INTRODUCTION:

Electromagnetic radiation is an important tool for diagnosing medical conditions (Kim, 2016), but it is additionally associated with leukemia, carcinomas, and dangerous genetic modifications in kids (van der Meij, 2018, Chang, 2017). Following the As Low As Suitable (ALARA) principle through radiological exams is a good way to lower these risks. To get the most out of radiological exams, it's important to use "Peak kilovolt age, Focal-film distance," and the right collimation to lower the dose of radiation that tissues and organs can absorb. The initial surface dose (ESD) (Karami, 2017) is the main factor that determines the dose of organs and tissues. ESD is a measure of the risk of cancer and genetic effects at low levels of electromagnetic radiation. Diagnostic indicate levels (DRLs) have been employed as guidelines to make sure patients are as safe as possible from radiation, but some radiologists may use lower doses than the DRLs set by the World Health Organization. "This study finds the ESD for the respiratory tract and skull", the dose that is efficient (ED) (Boice, 2018), the tissue dose, and the nearby dose level for for the very first time. These results will be used as initial data for X-ray exams in medical facilities.

LITERATURE REVIEW:

Recognizing the dose taken in by any organ and the threats that come with it is part of comprehension of the risks of a radiographic study. The entrance to the appear dose (ESD) is very significant, and it's important to know how ESD and dose received at tissue depth are related (Kim S and Cho K (2016), Nikzad S (2018)). Computerized methods are used to figure out the ideal dose, which looks at the effects of cancer and genetics. It is very important to compare dose values between countries (van der Meij EH (2018)). "The investigation finds the ESD for the chest and skull, leading to the effective dose (ED), the organ the dose, and

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neighborhood dose heights for the initial time. The results will be used as starting point for X-ray exams in hospitals. Evaluation indicates various levels (DRLs)" help keep patients safe from irradiation (Vodovatov AV, 2017).

MATERIAL AND METHOD:

The study looked at 110 patients receiving treatment at three healthcare facilities in Khorramabad and took four radiologists views: Chest Posterior-Anterior along with lateral estimations and Skull PA/LAT. Over the course of six months, information about age, sex, measurements, weight, and amount of exposure was collected. The Shimadzu, Inc R-20, MehranTeb DMT II, and Varian then Rad-8 were some of the devices that were looked into. The study used sampling convenience and the power of the Analysis and Sample Dimension applications to figure out how many people to include in the sample size calculation. Patients gave their verbal permission and proper protection.

RESULT AND DISCUSSION:

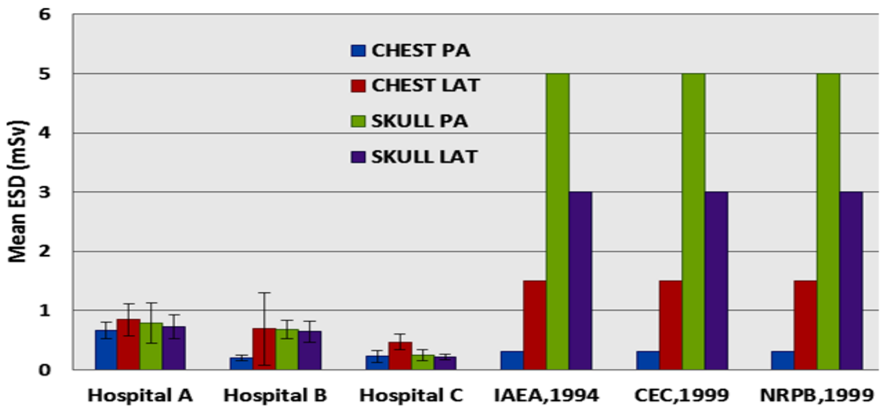
This study looked at four types of X-ray images: the skull PA/LAT and the chest PA/LAT, which were taken of 110 patients who were sent to three public health facilities (Hospital A, Healthcare B, and Hospital C). For each X-ray, information like age, sex, measurements, weight, and exposure settings like kVp, mAs, and FFD were written down. "The data was collected over six months using the Shimadzu R-20 (Japan) at Hospital A, the MehranTeb DMT II (Iran) at The hospital B, while the Varian Rad-8 (USA) at Hospital C."

The results show that variation in mAs alongside kVp have a strong effect on the entering dose (ED) and entering show up dose (ESD). The p-values for the skull and chest exams were 0.011 and 0.0001, as well. Personal demographic statistics and particulars about the chest and head exams at the three medical centers were linked. It is important to note that 61.81% of those being treated have been guys, and the rest were female. The ESD differ was collected using the following values: Chest PA (0.1075–0.8844), Chest LAT (0.2059–2.2997), Skull PA (0.0729–1.44), and Head LAT (the information that we pending).

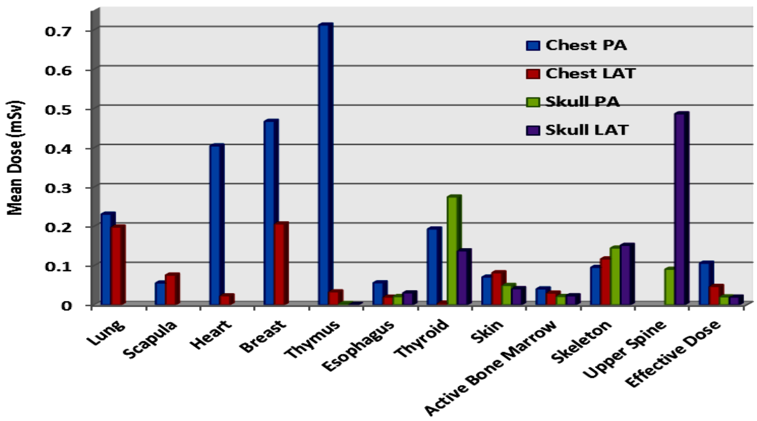
"Figure 1 compares the mean ESD across the three hospitals with benchmarks established by reference organizations. The results demonstrated that the average ESD for all examinations conducted at Hospital A was lower than that of Hospital B, and Hospital C had lower rates compared to both other hospitals and the reference organizations. Figure 2 illustrates the mean dose absorbed by vital organs during each examination at the three hospitals, noting that reproductive organs such as the ovaries and testes received negligible doses", leading to their exclusion from the figure. The highest absorption doses recorded were in the following tests: Chest "PA (0.712 mGy), Chest LAT (0.2 mGy), Skull PA (0.27 mGy), and Skull LAT (0.48 mGy), affecting the thymus, breast, lung, thyroid, and upper spine respectively."

"In Figure 3, the mean effective dose" from this study is compared with previous studies. Overall, the effective dose (ED) for all examinations was observed to be higher in the three hospitals than those reported by relevant organizations. "The highest effective dose was related to the Skull PA procedure at Hospital C (0.14 mGy). Ultimately, the total annual radiation dose across the three hospitals in was estimated at 2.74 person-Sv."

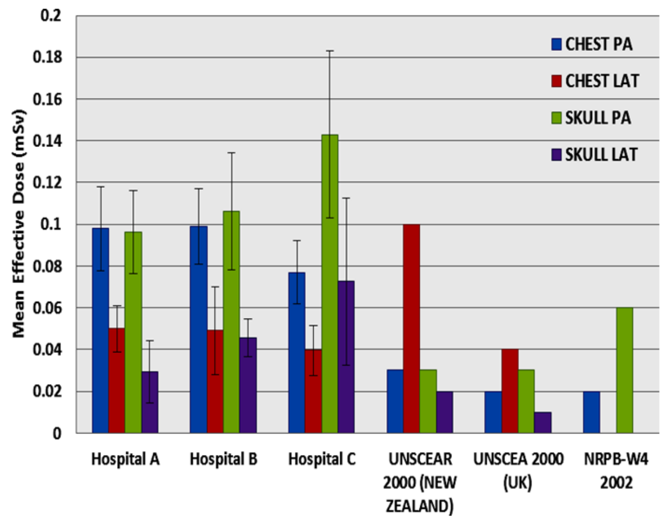
The study concluded that the initial external surface the dose (ESD) values for a habit of chest and skull X-rays were in line with Ackom et al. (2017) below the levels used for diagnosis. In relation to studies from other countries, skull exams had lower standard ESD values. Overexposed films, the weight of the patient, and access settings are some of the things that might cause the ESD to go down (Alghahtani et al., 2017). The results are also affected by how well the equipment works, like the speed of the film and the quality of the filters. Using thermoluminescent dosimeters, we can see a direct link between ESD and things like height and weight. Different ways of figuring out ESD could explain the differences in measured dose values. The effective dose found in hospitals has been reported than in other studies. This could be because there aren't enough competent fitness physicists (Figure 3). CALDose-X software gives more accurate estimates than PCXMC software, which tends to overestimate ESD. The higher dose of benefit found in the current investigation when compared with others may be due to differences in the level of dose the estimation programming and methods used in earlier research (Vodovatov, 2017; Nikzad, 2018). The estimate goes up because methods like CT scans, the fluoroscopy and coronary artery bypass absorb more radiation. This shows how important it is to keep doing investigations.



“Figure 1. Comparison mean ESDs in various radiography examinations and three hospitals with relevant organizations”



“Figure 2. Mean ESD in various radiography examinations”



"**Figure 3.** Mean effective dose in various radiography examinations and three hospitals compared with references values"

CONCLUSION:

Although the computed ED was almost larger than in previous research, "the mean ESD estimated in this study was lower than the DRL suggested by the NRPB, CEC, and IAEA". ESD/ED may be effectively reduced by a number of factors, including the use of high speed films, modern equipment, and performance. Furthermore, retraining radiology personnel is essential to obtaining the finest ALARA with the best medical picture quality.

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