

EVALUATION OF RADIATION HAZARD REGARDING THE DIFFERENCES OF RADIATION DOSES RECEIVED BY THYROID GLAND AND GONAD FOR MALE PATIENTS UNDERGOING CT SCAN EXAMINATION AT SARDJITO GENERAL HOSPITAL YOGYAKARTA PROVINCE- INDONESIA

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ABSTRACT

Background: CT scan is recognized as a high radiation dose modality. The use of it has increased substantially over the past decade regardless to the high radiation level received by patients. The potential cell damage in human body caused by the radiation during CT scan depends on the dose of radiation received by human body and the sensitivity of exposed tissues and organs. The superficial organs such as thyroid and gonads have a higher sensitivity in CT scan radiation dose which is significant enough to be a matter of concern. Moreover, beyond certain thresholds, radiation leads to impairment of tissues or organs function acute hazard for deterministic effect.

Objectives: To evaluate the differences among radiation dose received by thyroid gland and gonad for male patient undergoing brain, chest, and abdominopelvis CT examination, and to determine if the doses will reach the maximum threshold of deterministic effects.

Material and Methods: The current study is conducted in Radiology Department, Philips brilliance MDCT scan has been used in Dr. Sardjito General Hospital. Calibrated RAD-60 dosimeter in May 2016 is used to measure the radiation dose for thyroid gland and gonads. There are 45 patients divided into three groups 15 for brain CT scan, 15 for chest CT scan, and 15 for abdominopelvis CT scan. The data obtained are analyzed using ANOVA and T-test.

Results: The differences in radiation dose received by thyroid gland and gonads between three groups ($P < 0.05$). The highest mean of radiation dose received by thyroid gland in brain CT (12 ± 6 mSv), and the highest mean of radiation dose received by gonads in abdominopelvis CT (8 ± 5 mSv). By using T-test one way to compare sample mean with population mean ($P < 0.05$) which means that the radiation dose received by thyroid gland is less than 0.065 Gy, and the radiation dose received by gonads is less than 0.1 Gy because ($P < 0.05$).

Conclusion: There are wide differences between radiation dose received by thyroid gland and gonad for male patients undergoing CT scan examination. The major and important factors can affect to these differences is the distance. Fortunately, all of the maximum absorbed doses received by thyroid gland and gonads are less than the maximum thresholds of radiation hazard for deterministic effect, but the possibility cannot be excluded if multiple CT scan procedures are performed on the same patient.

Keywords: Thyroid gland, gonads, radiation doses, brain CT, chest CT, abdominopelvis CT.