

## ABSTRACT

*Exposure technique optimization is a crucial factor in digital radiography to balance diagnostic image quality and patient radiation protection. This objective can be achieved through the application of modification techniques, specifically the 15% rule and the 10 kVp rule. This study aims to analyze the effect of a 15% and 10 kVp increase in tube voltage on image quality, as represented by Signal-to-Noise Ratio (SNR) and Contrast-to-Noise Ratio (CNR) values, as well as on radiation dose through Exposure Index (EI) and Deviation Index (DI) parameters. Data acquisition was performed on a Philips DigitalDiagnost 4 High Performance system using a 17 cm thick PMMA phantom with three exposure settings: Standard Technique (66 kVp, 6.3 mAs), 15% Rule (76 kVp, 3.15 mAs), and 10 kVp Rule (76 kVp, 6.3 mAs). Image quality data, consisting of Mean and Standard Deviation (SD) values, were obtained through Region of Interest (ROI) analysis on the Acquisition Workstation, while DI values were manually calculated by comparing the measured EI against a target EI target of 300. The results demonstrated that the 10 kVp Rule produced the highest signal quality (SNR 568.20) but caused significant overexposure with a DI of +2.20. The Standard Technique provided the best contrast (CNR 1.58) but exhibited slight underexposure with a DI of -1.05, whereas the 15% Rule yielded the most optimal dose efficiency with a DI of -0.91, which was closest to the manufacturer's target. It can be concluded that the 15% Rule is the most optimal parameter as it enhances signal quality compared to the standard technique while maintaining efficient radiation doses in accordance with the As Low As Reasonably Achievable (ALARA) principle.*

**Keywords:** *Digital Radiography, Exposure Technique, Signal-to-Noise Ratio, Contrast-to-Noise Ratio, Exposure Index, Deviation Index.*