ABSTRACT

Dental panoramic X-ray is widely used in radiology installations to obtain images of teeth and jaw structures. However, radiation exposure does not only affect patients but can also spread to the surrounding area. Previous studies have mostly focused on image quality and patient dose, while research on the distribution pattern of radiation dose rates in the examination room, especially from moving X-ray sources, remains limited. Therefore, this study aims to map the distribution of radiation dose rates from a dental panoramic X-ray machine in the Radiology Installation of RSUD Al-Ihsan Bandung.

This study employed a quantitative experimental descriptive approach. Direct measurements were carried out using a survey meter with variations in distance, exposure time, and radiation direction. The data were analyzed by calculating dose rate values, plotting graphical relationships among variables, and applying the inverse square law to evaluate the conformity of the radiation distribution with its mathematical model.

The results showed that the dose rate decreases with increasing distance from the source, consistent with the inverse square law with a coefficient of determination (R^2) > 0.95. The directional variation revealed an anisotropic distribution, with the highest values observed at angles aligned with the source (0° and 180°) and the lowest at certain angles due to machine obstruction. In addition, exposure time influenced fluctuations in dose distribution following gantry rotation.

In conclusion, the radiation dose rate distribution of dental panoramic X-ray is affected by distance, exposure time, and radiation direction. This study is significant because it provides a mapping of radiation distribution in the examination room, which can serve as a basis for strengthening radiation safety practices as well as a reference for future research and the academic community of Diponegoro University.

Keywords: *dental X-ray, absorbed dose, radiation distribution, inverse square law, radiation safety.*