

**ANALYSIS OF TUMOR CONTROL AND NORMAL TISSUE
COMPLICATION PROBABILITY IN STAGE III CERVICAL
CANCER USING EQUIVALENT UNIFORM DOSE WITH
3DCRT**

BACHELOR'S THESIS



**Angelica Defalma
2110441034**

Supervisor: Sri Oktamuliani, S.Si., M.Si., Ph. D

**DEPARTMENT OF PHYSICS
FACULTY OF MATHEMATICS AND NATURAL SCIENCES
UNIVERSITAS ANDALAS
PADANG**

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ABSTRACT

This study aimed to evaluate dosimetric and radiobiological parameters in 24 patients with Stage III cervical cancer treated using Three-Dimensional Conformal Radiation Therapy (3DCRT) at Universitas Andalas Hospital. The physical dose quality was assessed using the Homogeneity Index (HI) and Conformity Index (CI), while biological effectiveness was analyzed using the Equivalent Uniform Dose (EUD) model. Tumor Control Probability (TCP) and Normal Tissue Complication Probability (NTCP) were calculated based on Niemierko's formalism. Dose-volume histogram (DVH) data were extracted from Eclipse TPS and processed with Python scripts. Results showed that HI and CI values fell within clinically acceptable standards, indicating uniform and conformal dose distributions. The mean TCP was $41.36\% \pm 0.31\%$, suggesting a moderate probability of tumor control. For NTCP, the bladder exhibited the highest risk with a mean of $83.16\% \pm 26.78\%$, often exceeding its tolerance dose ($TD_{50} = 80$ Gy). In contrast, the bowel and rectum showed lower complication probabilities, with mean NTCP values of $2.06\% \pm 3.00\%$ and $0.40\% \pm 0.18\%$, respectively. These findings indicate that while 3DCRT provides satisfactory physical coverage, special attention is needed to minimize complications in organs at risk, particularly the bladder.

Keyword: cervical cancer, radiotherapy, HI, CI, EUD, TCP, NTCP

