

Evaluation of Inter-fractional Geometric and Dosimetric Variations in Gynaecology Brachytherapy based on C-arm X-ray Images in Carcinoma of Cervix at Apeksha Hospital Maharagama

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Treatment reproducibility is a key aspect of accurate radiotherapy to achieve better target coverage and normal organ sparing. Uniform protocols for these procedures should be maintained to achieve this. Partial coverage of the target leads to recurrence of the tumour and over exposure of organs at risk (OAR) results in severe complications. Therefore, close consideration of the doses and volumes during the planning process and consideration of inter-fractional treatment variations are essential to minimize such complications. The aim of this study is to assess the relationship among inter-fractional technical, geometrical, and dosimetric variations and to determine the causes for these variations in gynaecology brachytherapy for carcinoma of cervix. A total of 211 subjects who had completed High Dose Rate (HDR) brachytherapy between January 2022 and January 2023 at Apeksha Hospital Maharagama were selected for this study. Data were obtained from the logbook and daily dose profile which were available in the HDRplus 3.0 software. The data included treated volumes, delivered doses, number of activated dwell points, applicator distances and number of packs utilized. The data was further analysed using the IBM Statistical package for the social sciences (SPSS) statistics software (version 28.0). According to the results, correlations between treated volume variations and applicator variations are mostly significant, and the correlation with tandem is highly significant. Correlations between bladder dose variations and applicator variations are mostly insignificant while the correlations between rectal dose variations and applicator variations are totally insignificant. The relationship between dosimetric variations of both the bladder and the rectum are highly significant with the variations in the number of gauze packs utilized inter-fractionally. In conclusion, geometric variations were predominantly affected by applicator variations of the tandem while bladder and rectal doses were less affected by applicator variations and were mostly affected by gauze packs.

Keywords: *radiotherapy, high dose rate brachytherapy, treated volume, bladder dose, rectal dose, gauze packs, applicators.*