

## **ABSTRACT**

*Nasopharyngeal carcinoma (NPC) is a radiosensitive type of head and neck cancer located in a complex anatomical region, requiring highly precise radiation techniques. This study aimed to compare the dosimetric effectiveness of coplanar and non-coplanar Intensity Modulated Radiation Therapy (IMRT) planning in stage III and IV NPC patients using the Eclipse Treatment Planning System (TPS). A total of 12 patients were retrospectively selected and each received two IMRT plans: the coplanar plan employed 11 radiation fields with gantry angles of 49°, 85°, 114°, 140°, 178°, 206°, 243°, 272°, 305°, and 350°, all with a couch angle of 0°; while the non-coplanar plan included 9 coplanar beams and 2 additional non-coplanar beams with gantry angles of 132.1° and 299.5° and a couch angle of 270°. Evaluation parameters included V95% for the Planning Target Volume (PTV), Conformity Index (CI), Homogeneity Index (HI), as well as the mean and maximum doses to several Organs at Risk (OARs). Data were analyzed using the Shapiro–Wilk normality test ( $p > 0.05$  indicates normal distribution), followed by paired t-test and Wilcoxon signed-rank test with a significance level of 0.05. The results showed that the coplanar technique provided better CI (0.99) and lower HI (0.05) compared to the non-coplanar plan (CI = 0.98; HI = 0.07), and generally resulted in lower doses to most OARs. However, statistical analysis indicated that the differences between the two techniques were not significant ( $p$ -value  $> 0.05$ ). Thus, although not statistically significant, the coplanar technique demonstrated a more favorable dosimetric profile in terms of target coverage and healthy tissue sparing in nasopharyngeal cancer cases.*

**Keywords:** *nasopharyngeal carcinoma, intensity modulated radiation therapy IMRT, non-coplanar, Planning Target Volume (PTV), organ at risk*