Abstract

Human Papillomavirus (HPV) infects mucous membranes and skin, with two main types: low-risk, causing warts, and high-risk, linked to cervical cancer. Accurate identification of HPV serotypes is crucial for developing effective treatment strategies. However, current methods lack precision in distinguishing HPV types. This study aims to develop an accurate detection method for high-risk HPV using newly designed Loop-mediated Isothermal Amplification (LAMP) primers. In this thesis, PCR, LAMP, and colorimetric LAMP were employed to identify target regions of HPV. Gel electrophoresis was used to visualize and compare amplification results. Findings revealed that LAMP and colorimetric LAMP serve as effective alternatives to PCR for HPV detection. Primers targeting HPV18 E7 and L1 genes, and HPV16 E6 gene were designed and tested on HeLa cells. The LAMP results closely matched those of PCR, with optimal primer temperatures between 60–65°C. Primer sensitivity was highest at 50–100 ng/µl DNA concentrations. However, the primer for HPV16 E6 showed non-specific amplification. The colorimetric LAMP assay demonstrated greater accuracy compared to PCR and conventional LAMP, making it a promising tool for HPV detection, especially in rural areas lacking advanced laboratory equipment. This simpler, rapid approach can improve HPV diagnostics, specifically for high-risk types, supporting better treatment strategies and infection control. Overall, this thesis contributes to enhancing HPV detection methods, aiding efforts to manage and reduce HPV-related diseases.

Keywords: Human Papillomavirus (HPV), high-risk HPV, Loop-Mediated Isothermal Amplification (LAMP)