Development and characterization of topical formulations of adefovir dipivoxil for the prevention of HIV infection
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• HIV infection has been a global health issue for past three decades. Around 2 million new cases of HIV are reported every year, and if left untreated will result in AIDS. Currently, there are no vaccines available to prevent acquisition and transmission of HIV. Majority of HIV infections are acquired through sexual contact. Preventative measures in the form of Pre-Exposure Prophylaxis (PrEP) have provided an approach to reduce the sexual transmission of the virus.
• Currently, several clinical trials are ongoing to evaluate the efficacy of local (vaginal or rectal) delivery of anti-HIV drugs for reducing sexual transmission of HIV infection.
• Polymeric films are being explored to enable vaginal delivery of anti-HIV drugs for the vaginal PrEP of HIV infections.
• Adefovir dipivoxil (ADV) is an FDA-approved nucleotide reverse transcriptase inhibitor used for the treatment of chronic HBV infections. Studies have shown that ADV is also active against HIV-1 and HIV-2. Thus, it is possible to “repurpose” ADV for the HIV PrEP.

INTRODUCTION
• To develop ADV containing polymeric film to enable repurposing of ADV for the vaginal PrEP of HIV infection

OBJECTIVE
• Calibration Curve of ADV in Simulated Vaginal Fluid (SVF)
  A stock solution of ADV in ethanol was diluted with SVF to obtain solution containing ADV concentration of 4, 8, 16 and 20 ppm respectively. Absorbance of ADV solution was measured at 260.5 nm. Calibration curve was obtained by plotting absorbance versus concentration.
• Development of Films
  The placebo films were prepared by solvent casting technique. The solution was poured into a petri plate placed on a flat surface to form a uniform layer and air dried to form a film. The film was then carefully removed and cut into the desired dimensions.
• Characterization of Films
  The developed films were tested for organoleptic, physical, and physiochemical properties.
• In vitro release studies
  In vitro release of ADV from polymeric films was studied using a Franz diffusion cell. Aliquots were taken at 30, 60, 120, 180, 240, 300, and 360 min and the amount of ADV released was calculated by measuring the absorbance.

RESULTS
• Vaginal films impregnated with ADV films may be used as a vaginal microbicide product that could effectively provide pre-exposure prophylaxis against sexual transmission of HIV.
• Figure 1. The optimization of content of ADV in the polymeric films. ADV content/unit surface area from right to left: 10 mg/4 cm², 8 mg/4.5 cm², 5 mg/4.5 cm², 5 mg/7.5 cm². The quantity of ADV/unit surface area showed significant impact on the appearance and physical properties of the film.

CONCLUSIONS
• In vitro release studies using Franz diffusion cell showed that the composition of the film had an impact on the release of ADV from the film.

MATERIALS AND METHODS

% Cumulative Drug Release from Formulations

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Figure 1

Figure 2.

% Cumulative Drug Release from Formulations

Adefovir Dipivoxil Structure