7. SUMMARY

More than 80 types of herpes viruses have been identified and eight of them are pathogens for human. Human herpes simplex virus (HSV) is a contagious infection with a large reservoir in the general population and also possesses potential for significant complications in the immune-compromised subjects. HSV-associated diseases are among the most widespread infections, affecting nearly 60% to 95% of human adults. Herpes infections are generally incurable and persist during the lifetime of the host often in latent form. Acyclovir is an anti-viral drug made up of acyclic guanosine analogue which target viral polymerase and viral DNA replication. Poor bioavailability (10%-20%) and short plasma half-life are the major drawbacks of Acyclovir leads to frequent dosing.

Ganciclovir is a guanosine derivative that inhibits DNA replication of herpes simplex viruses (HSV) upon phosphorylation. Absorption of the oral form is very limited, i.e. about 5% fasting, about 8% with food. It achieves a concentration in the central nervous system of about 50% of the plasma level. About 90% of plasma Ganciclovir is eliminated unchanged in the urine, with a half-life of 2-6 hours, depending on renal function.

Human immunodeficiency virus infection / acquired immunodeficiency syndrome (HIV/AIDS) is a disease of the human immune system caused by infection with human immunodeficiency virus (HIV). Currently no sure shot treatment or effective HIV vaccine is available in market. Treatment consists of high active antiretroviral therapy (HAART) which slows progression of the disease. Zidovudine (INN) or azidothymidine (AZT) (also called ZDV) is a nucleoside analog reverse-transcriptase inhibitor (NRTI), a type of antiretroviral drug used for the treatment of HIV/AIDS infection. AZT is the first U.S. government-approved treatment for HIV, marketed under the brand name Retrovir.

In present study, novel vesicular based drug delivery systems were proposed for these three drugs to overcome the limitation of current conventional drug delivery systems. To improve the topical treatment of herpes simplex, niosome vesicle based topical gel was proposed. Niosome vesicle based formulation was developed, optimized and characterized. The data shows that Acyclovir niosomal topical gel is more effective as compared to conventional drug delivery system. The data shows that drug penetrates in deeper layers of skin as well as remains there to provide better availability at the site of action.
Major issue regarding ocular drug delivery system is the loss of drug at the site of action due to tear secretion and drainage. Ganciclovir has very less bioavailability via oral route and moreover; the ocular herpes infects the area of eye where blood secretion is very less. Thus, topical treatment is more effective. Liposome vesicles are adhesive in nature and hence the vesicles can stick to various sections of eye and the drainage can be reduced. The data shows that Ganciclovir liposomal eye drop provides sustained release action as well as non-irritant to eye. The data of HET-CAM test shows that there is no concern regarding eye irritation. Thus, improved retention in eye at the site of action, sustained release profile and non-irritant nature of liposomal drug delivery system projects it as better alternative as compared to conventional drug eye drops of Ganciclovir.

Treatment of HIV infection requires daily dosing of anti-viral drugs. The daily dosing may cause gastric disturbance and other gastric related side effects. To overcome this issue, transdermal drug delivery system for Zidovudine has been proposed. Ethosome vesicles are mallable and comparatively more flexible as compared to other vesicles. Hence, they claim better skin penetration through the cells as well as from gap between two cells. The data shows that transdermal Zidovudine ethosomal gel provides sustained release action and maintains desired therapeutic concentration.

Overall; novel vesicular drug delivery systems offer more advantages as compared to conventional drug delivery systems. Moreover; they are non-invasive, non-irritant and offers better functionality.
8. CONCLUSION

Acyclovir niosomal gel for topical application was prepared and evaluated for different characterization tests. Morphological studies show that niosome vesicles were spherical in shape and unilamellar in nature. Sustained release pattern of drug from niosome vesicle was obtained for a prolonged period of time. The skin irritation study shows that there were no signs of irritation due to niosomal dosage form. Overall; it can be concluded that niosome vesicles can be a preferable choice of drug delivery for the treatment of herpes simplex as topical drug delivery system.

Ganciclovir liposomal eye drops were formulated and evaluated for different tests. The data shows that vesicles were round shaped and unilamellar in nature. The data shows that sustained release profile is obtained. The HET-CAM test reveals that the Ganciclovir liposomal eye drops are non-irritant in nature. Overall; it can be concluded that liposome vesicles are preferable choice for treatment of ocular herpes and offers great functionality as compared to conventional ocular drug delivery system.

Zidovudine ethosomal gel was formulated and evaluated for various characterization tests. Ethosome vesicles are more mallable in nature as compared to any other vesicles hence it offers better skin penetration. The data shows that Zidovudine ethosomal gel provides sustained release profile as well as it is non-irritant in nature. Transdermal system offers complete bypass of first pass metabolism. Thus, it can be concluded that treatment of HIV infection by transdermal route using ethosome vesicle as carrier can be a preferable choice of drug delivery system.