

## Formulation, Characterization and Optimization of Transfersomal Bovine Lactoferrin as a Novel Non-Invasive Topical Treatment for Genital Warts Caused by Human Papiluma Virus (HPV)

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### Abstract

**Introduction:** Human papilloma virus (HPV) causes common warts, laryngeal papilloma and genital condylomata and might lead to development of cervical cancer. Lactoferrin (LF), a member of the transferrin family, is a bi-globular protein and has antiviral activity against HPV-16. LF is an important player in the defense against pathogenic microorganisms and has also shown to have activity against several viruses including herpesvirus, adenovirus, rotavirus and poliovirus. Bovine LF has been reported to be a more potent inhibitor of HPV entry than human LF. The goal of the present study was to formulate, evaluate and optimize transfersomal vesicles as a transdermal drug delivery system for the lactoferrin which assumed to be a suitable non-invasive transdermal delivery system for treatment of genital warts.

**Methods and Results:** Transfersomes have been prepared by two methods of reverse phase evaporation and thin film hydration with different ratios of cholesterol: lecithin: DOTAP in the presence of SDS or Tween 80. The transfersomes were then evaluated regarding size, polydispersity and LF loading. In vitro release studies in pH 5.3, stability evaluation in 4°C and 24°C and TEM imaging has been performed on optimized transfersomal lactoferrin. The optimized transfersomes were found to have 100 nm sizes with good PDI and encapsulation efficiency of 91% for lactoferrin as well as sustained release of lactoferrin during 24 hours. It was shown that unlike lactoferinn which should be stored in cold temperature, transfersomal lactoferrin would be stable in cool conditions.

### Conclusions:

The elastic vesicular systems like transfersomes are one of the most controversial methods for transdermal delivery of active substances specially macromolecules and proteins. It was found that transfersomes would be ideal nano carriers with high loading efficiency and size uniformity as well as improving stability of lactoferrin. Further study is needed to investigate its efficacy in treatment of HPV caused genital warts and its viral inhibitory function.

**Key words:** Optimization, Transfersomal, Bovine Lactoferrin, Human Papiluma Virus (HPV)

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