7. **Conclusion**

- From the study, we found that silymarin showed maximum protection among four-tested drugs against D-galactosamine, paracetamol and alcohol induced cytotoxicities *in vitro* on Chang liver cells and *in vivo* against D-galactosamine and alcohol induced hepatotoxicities in Wistar rats.

- We achieved success in incorporating phytosomal forms of silymarin in liposomal carrier system. Formulations were characterized by particle size, zeta potential, DSC thermogram, XRD data, and TEM image.

- *In vitro* release profile showed better release of silymarin from all liposomes compared to free drug with highest release from conventional and DP-liposome at pH 1.2 and from Conventional and PEGylated at pH 7.4.

- Conventional and PEGylated liposomal formulations showed better protection to Chang liver cells against cytotoxicity of paracetamol, D-galactosamine and alcohol.

- Conventional and DP-liposomes showed a better inhibition on LPS-induced ROS formation.

- Better hepatoprotection, (assessed through liver function tests), and anti-inflammatory effects (assessed through the cytokines level namely IL-6; and myeloperoxidase) with conventional liposome of silymarin was achieved when compared to silymarin alone in all three hepatotoxic models, which further strengthened the concept of this novel formulation.

- The improved *in vivo* function of conventional liposomal formulation was also ascertained by histopathology reports in the tested hepatotoxic models.

- Conventional liposome showed a significant elevation in antioxidant levels compared to silymarin alone in Wistar rats in all three hepatotoxic models.

- Investigation of the pharmacokinetic results from the oral administration of silymarin and its conventional liposomes showed that conventional liposomes increased $C_{\text{max}}$ more than five times compared to silymarin alone in normal rats and almost six times in alcoholic liver disease condition in rat.

- Thus, liposomal formulation of silymarin is a suitable candidate and can be used as liver protectant.