CHAPTER V
CONCLUSIONS

In this study, glucosamine hydrochloride (GS HCl) was prepared in various dosage forms such as water solution, hydroalcoholic solution, gel and microemulsion in order to investigate the potential for enhancement of the permeation of GS HCl through pig ear skin. The potential of enhancing permeability of the preparation studied can be ranked as the following : Tween 80 (non-ionic) surfactant microemulsion > hydroalcoholic solution containing 10% ethanol > water solution > HPMC gel > CTAB (cationic surfactant) microemulsion > AOT (anionic surfactant) microemulsion > lecithin (zwittering-ionic surfactant) microemulsion. The conclusion can be drawn as the following:

The permeability of drug from the mixture of Tween 80, water and isopropyl myristate that was rearranged to form microemulsion structure, was more than the micelle system of water and Tween 80.

The enhancing effect of Tween 80 microemulsion on drug permeation was probably due to the high water content in the formulation. In addition, the permeability was dependent on type of surfactant and type of the microemulsion structure. The non-ionic surfactant, Tween 80, microemulsion could effectively enhance the permeability of GS HCl and microemulsion type has to be oil in water. The benefit of using non-ionic surfactant was also shown in stability of the system. However, the amount of drug loading in the microemulsion did not affect permeability of GS HCl.

For hydroalcholic solution, the presence of ethanol at low content, 10% in the formulation, could improve permeability of GS HCl better than water solution due to the property of ethanol as permeation enhancer. However, the high ethanol content of 60% failed to enhance the permeability as a result of protein denaturization in pig skin.

HPMC gel preparation gave lower drug permeability relative to water solution, hydrolcoholic solution. The effect of high water content in the formulation on permeability was hindered by hydrophilic nature of the polymer, the hydrophilic drug would prefer to be trapped in the hydrophilic network.

According to the results, the preparation that could enhance the permeability of GS HCl through pig skin involved high water content formulations.

Suggestion for the further study

The developing GS HCl transdermal delivery system should have more information such as :

1. The evidence to confirm the pathway of GS HCl transport through pig ear skin.
2. Stability data and how to solve the problem of color change in the formulation.
3. The *in vitro and in vivo* behavior of GS HCl transdermal formulation on the human skin.