



**Developing Atorvastatin calcium transdermal patches and  
application on rat skin**

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**This thesis was submitted in partial fulfillment of the  
requirements for the master's degree in pharmaceutical  
sciences**

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of the requirement for the degree of master**

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**Abstract**

Atorvastatin is a statin molecule, which is used for the treatment of hypercholesteremia to prevent cardiovascular disease. It is available as oral dosage form with four strengths; 10mg, 20mg, 40mg, and 80mg, it has low bioavailability due to its first pass metabolism in the liver and gastrointestinal tract. Atorvastatin has serious adverse side effects especially in liver and leads to myalgia and myopathy. In this study, a new microemulsion was developed using Dimethyl Sulfoxide, Polyethylene glycol400, Isopropyl myristate, and non-ionic surfactant Tween 80 for transdermal of Atorvastatin to improve bioavailability and reduce side effect. The MEs formulae were characterized in vitro using Franz cell, droplet size and rheological properties. The formula which contains 800mg Atorvastatin calcium, 4ml Dimethyl Sulfoxide, 2ml Polyethylene glycol400 and,4ml Isopropyl myristate gave us a clear stable microemulsion with high flux rate  $10.078\text{mcg}/\text{cm}^2/\text{hr}$ . it was tested orally and transdermally in vivo using rats. In transdermal application it gives maximum concentration  $1.02\text{mcg}/\text{hr}$ , 5hr Tmax, and long duration time around 48hr without any irritation on the skin and no adverse effects had appeared on rats. No significant elevation in Creatinine Kinase and Alanine Transferase has been recorded in transdermal application comparing to oral application.

## COMMITTEE DECISION

**This Thesis/Dissertation (Developing Atorvastatin calcium transdermal patches and application on rat) was successfully Defended and Approved on .....**

### **Examination Committee Signature**

Prof Dr. Raad Al-Ani (Supervisor).

Dr. Eman Alzmaeli (Internal Member).

Prof Dr. Enam Khalil (External examiner)

## **Dedication**

This thesis is dedicated to:

The sake of Allah, my Creator and my Master,

My great teacher and messenger, Mohammed (May Allah bless

and grant him), who taught us the purpose of life,

My great parents, who never stop giving of themselves in countless

ways,

My beloved brothers and sisters

My dearest manager, who supported me a lot,

To all my Friends and employees in united, the symbol of love and giving,

All the people in my life who touch my heart,

I dedicate this research.

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## LIST OF ABBREVIATIONS OR SYMBOLS

TDDS	Transdermal drug delivery systems
HMG-CoA	3-hydroxy-3-methylglutarylcoenzyme
DMF	Dimethylfuran
PBS	Phosphate buffer system
AT	Atorvastatin
LDL	Low density lipoprotein
ALT	Alanine transfers
PEG 400	Polyethylene glycol 400
DMSO	Dimethyl sulfoxide
IPM	Isopropyl myristate
SC	Stratum corneum
HPMC	Hydroxypropylmethylcellouse
CK	Creatinine Kinase
MET	Methanol
ACN	Acetonitrile
ME	Microemulsion