



**Ain Shams University**  
**Faculty of Pharmacy**  
**Department of Pharmaceutics and Industrial Pharmacy**  
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**“Optimizing the nutraceutical formulations of chondroitin sulphate and glucosamine sulphate using certain pharmaceutical technologies”**

*A Thesis Submitted By*

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*This thesis is dedicated to*

*The spirit of my lovely father*

*My lovely compassionate mother*

*My lovely brother and sister*

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<b>1L-1</b>	Interleukin-1
<b>APIs</b>	Active pharmaceutical ingredients
<b>COA</b>	Certificate of analysis
<b>COX-2</b>	Cyclooxygenase-2
<b>CPC</b>	Cetylpyridinium chloride
<b>CS</b>	Chondroitin sulphate
<b>DJD</b>	Degenerative joint disease
<b>DSC</b>	Differential scanning calorimetry
<b>ECGC</b>	Epigallocatechin-3-Gallate
<b>EE%</b>	Entrapment efficiency percent
<b>FAV</b>	Fatty acid vesicles
<b>FDA</b>	US Food and Drug Administration
<b>FDTs</b>	Fast dissolving tablets
<b>FTIR</b>	Fourier transmission infrared
<b>GAGs</b>	Glucosaminoglycans
<b>GIT</b>	Gastrointestinal tract
<b>GluS</b>	Glucosamine sulphate
<b>LOD</b>	Limit of detection
<b>LOQ</b>	Limit of quantification
<b>LUVs</b>	Large unilamellar vesicles
<b>MCP-1</b>	Monocyte chemoattractant protein-1
<b>MLVs</b>	Multilamellar large vesicles
<b>NO</b>	Nitric oxide
<b>NSAIDs</b>	Non-steroidal anti-inflammatory drugs
<b>OA</b>	Osteoarthritis
<b>ODTs</b>	Oral disintegrating tablets
<b>PDI</b>	Polydispersity index
<b>PGE<sub>2</sub></b>	1L-1 $\beta$ -induced prostaglandin E <sub>2</sub>

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<b>PS</b>	Particle size
<b>SEDDs</b>	Self-emulsifying drug delivery systems
<b>SEM</b>	Scanning electron microscope
<b>SSNEs</b>	Solid self-nanoemulsifying systems
<b>SUVs</b>	Small unilamellar vesicles
<b>TEM</b>	Transmission electron microscope
<b>TNF<math>\alpha</math></b>	Tumor necrosis factor
<b>WHO</b>	World Health Organization
<b><math>\beta</math>-CD</b>	Beta-cyclodextrin

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