

**DEVELOPMENT OF CURCUMIN TOPICAL EMULSION FOR
OSTEOARTHRITIS TREATMENT**

By

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STATEMENT BY THE AUTHOR

I hereby declare that this submission is my own work and to the best of my knowledge, it contains no material previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any other degree or diploma at any educational institution, except where due acknowledgement is made in the thesis.



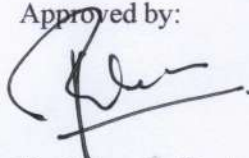
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ABSTRACT

DEVELOPMENT OF CURCUMIN TOPICAL EMULSION FOR OSTEOARTHRITIS TREATMENT

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Degenerative joint disease (osteoarthritis/OA) affects many people worldwide. In 2018, 8.5% of Indonesian women and 6.1% of men had the condition. Both nonpharmacologic and pharmacological therapies are available. Pharmaceutical side effects are reduced when osteoarthritis is treated with natural ingredients. Curcumin is chosen for its antioxidant, anti-inflammatory, and analgesic properties. This research seeks the ideal curcumin content, oil type, and pH in topical emulsion for OA treatment. It will also design production method and test its stability. Multiple research in early experiments results in the emulsion formula with 0.25% curcumin extract in water-in-oil emulsion using virgin coconut oil (VCO) or rice-bran oil (RBO). Oil phase was mixed and melted at 55°C with added curcumin, then water phase with pH adjusted using glycolic acid was added and homogenized. Curcumin degradation was greatest at 55–65°C, with an IC_{50} of 29.04 PPM in the emulsion. VCO has less antioxidant activity than RBO, even though VCO was found to be more stable. At pH 4 and 5, both oils were more stable than at pH 7. The pH 4 RBO formulation shown higher stability of color. No phase separation was observed during 14 days stability tests for both oil. Rice bran oil emulsion with 0.25% curcumin, and pH 4 is considered optimum.

Keywords: Osteoarthritis, Curcumin, Emulsion, Pain Relief

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DEDICATION

This thesis is dedicated to all osteoarthritis patients around the world, who have been searching for a natural and non-toxic solution to manage the debilitating symptoms of this condition. It is my hope that the development of a curcumin emulsion, with its improved stability and enhanced bioavailability, will provide a more effective and patient-friendly treatment option for those affected by osteoarthritis, ultimately improving their quality of life. I also dedicate this study to my family, who have supported me throughout this journey, and to my lecturers and friends, who have provided valuable insights and encouragement along the way. It is my sincere wish that this research will contribute to the advancement of osteoarthritis treatment and bring relief to those who need it most.

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