

# Potensi Mekanisme Penghambatan *Candida* sp. oleh Minyak Atsiri Pala (*Myristica fragrans* Houtt.) = Potential Inhibition Mechanism *Candida* sp. of Nutmeg (*Myristica fragrans* Houtt.) Essential Oil

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## Abstrak

Infeksi sistemik yang disebabkan oleh spesies kandida memiliki tingkat mortalitas tinggi. Spesies yang sering menginfeksi diantaranya adalah *Candida albicans*, *Candida parapsilosis*, *Candida glabrata*, *Candida tropicalis*, dan *Candida krusei*. Saat ini, telah banyak ditemukan beberapa kasus resistensi dalam pengobatan infeksi kandida. Untuk mengatasi masalah tersebut, diperlukan alternatif pengobatan baru. Bahan alam dikenal sebagai alternatif pengobatan yang potensial karena efek toksik rendah dan sumbernya yang melimpah. Minyak atsiri Pala (*Myristica fragrans* Houtt.) merupakan salah satu bahan alam yang telah diketahui memiliki aktivitas antikandida. Namun, mekanisme penghambatannya belum ditemukan. Dalam ulasan ini, kami mencoba mengkaji mekanisme penghambatan minyak atsiri Pala terhadap *Candida* sp. berdasarkan kandungan kimianya dan dibandingkan dengan obat antikandida yang sudah ada. Selain itu, juga akan dibahas beberapa metodologi yang dapat digunakan untuk pengujiannya berdasarkan studi literatur. Dari hasil ulasan ini, didapatkan beberapa kandungan kimia minyak atsiri Pala yang memiliki potensi penghambatan terhadap *Candida* sp. yaitu, -pinene, -pinene, terpinen-4-ol, dan limonene. Komponen kimia yang terkandung dalam minyak atsiri Pala (*Myristica fragrans* Houtt.) menunjukkan bahwa minyak atsiri ini berpotensi sebagai antikandida dengan multitarget. Namun, untuk mengonfirmasi potensi tersebut diperlukan studi lebih lanjut menggunakan beberapa metode diantaranya kuantifikasi biomassa sel dengan pengujian kristal violet, pengujian aktivitas mitokondria dengan MTT, identifikasi potensi penghambatan dengan Time Addition Assay, observasi kerusakan permukaan sel menggunakan Scanning Electron Microscopy (SEM), kuantifikasi gen menggunakan qPCR, identifikasi protein responsif, dan pengujian efek inhibisi di bawah tekanan osmotik.

.....Systemic infections caused by candida species have a high mortality rate. Species that often infect them are *Candida albicans*, *Candida parapsilosis*, *Candida glabrata*, *Candida tropicalis*, and *Candida krusei*. At present, there have been many cases of resistance found in the treatment of candida infections. To overcome this problem, we needed new alternative treatments. Natural products already known as potential alternative treatment because of their low toxic effect and exist abundantly. Nutmeg essential oil (*Myristica fragrans* Houtt.) is one of the natural ingredients that has known to have anticandida activity. However, the mechanism of inhibition has not found. In this review, we try to examine the inhibition mechanism of Nutmeg essential oil against *Candida* sp. based on its chemical content and compare with commercial anticandida. Also, several methodologies that can use for testing are based on literature studies as well. From the results of this review, it has found that some of the chemical content of nutmeg essential oil has the potential as anticandida. There are -pinene, -pinene, terpinen-4-ol, and limonene. The chemical components contained in Nutmeg essential oil (*Myristica fragrans* Houtt.) show that this essential oil has the potential to be a multitarget anticandida. However, to confirm this potential, further studies are needed. There are several methods can be used including quantification of cell biomass with crystal violet assay, testing of mitochondrial activity with MTT assay, identification of inhibitory potential with Time Addition Assay,

observation of cell surface damage using Scanning Electron Microscopy (SEM), quantification of genes using qPCR, identification of responsive proteins, and testing inhibitory effect under osmotic pressure.</i>