

Analisis Transmission Electron Microscopy: Ultrastruktur Sel *Candida albicans* ATCC 10231 Pada Biofilm Fase Maturasi yang Tereradikasi Ekstrak Etanol Temulawak (*Curcuma xanthorrhiza* Roxb.) =  
Transmission Electron Microscopy Studies on *Candida albicans* ATCC 10231 Biofilm at Maturation Phase Which Has Been Eradicated by Javanese Turmeric (*Curcuma xanthorrhiza* Roxb.) Ethanol Extract

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Abstrak

Latar Belakang: Temulawak (*Curcuma xanthorrhiza* Roxb.), sebagai salah satu tanaman obat unggulan Indonesia, dilaporkan memiliki efek eradikasi terhadap biofilm *Candida albicans* (*C. albicans*). Studi analisis Scanning Electron Microscopy (SEM) melaporkan penurunan densitas biofilm serta perubahan morfologi sel *C. albicans* yang terpapar Ekstrak Etanol Temulawak (EET). Namun bagaimana perubahan ultrastruktur sel *C. albicans* pada biofilm fase maturasi yang tereradikasi EET belum diketahui. Tujuan: Menganalisis gambaran ultrastruktur sel *C. albicans* ATCC 10231 pada biofilm fase maturasi setelah paparan EET. Metode: Biofilm *C. albicans* diinkubasi selama 48 jam agar mencapai fase maturasi, kemudian kelompok perlakuan dipaparkan EET dengan konsentrasi sesuai kadar eradikasi biofilm minimal (KEBM) yaitu 30%, kelompok kontrol positif diberikan paparan nystatin 100000 IU/ml, dan kelompok kontrol negatif tidak diberikan perlakuan. Transmission Electron Microscopy (TEM) dipakai untuk melihat perubahan ultrastruktur sel *C. albicans* pada biofilm. Hasil: Perubahan gambaran ultrastruktur sel *C. albicans* pada biofilm fase maturasi yang dipaparkan EET meliputi perubahan bentuk sel, perubahan ketebalan dinding sel, serta kerusakan organel. Kesimpulan: Analisis TEM menunjukkan perubahan sel *Candida albicans* ATCC 10231 pada sebagian sel biofilm fase maturasi yang tereradikasi EET.

.....Background: Javanese turmeric (*Curcuma xanthorrhiza* Roxb.), as one of Indonesia's eminent medicinal plant, had been reported for having eradication effect towards *Candida albicans* biofilm. SEM studies have shown that the exposure of javanese turmeric ethanol extract decreases the biofilm density and made changes in *C. albicans* cells morphology. However, the changes in cellular ultrastructure of *C. albicans* in biofilm at maturation phase which has been eradicated by javanese turmeric extract is not yet known.

Objective: Analyzing the image of cellular ultrastructure of *C. albicans* ATCC 10231 biofilm at maturation phase after exposed to Javanese turmeric ethanol extract using Transmission Electron Microscopy. Method: *C. albicans* biofilm was incubated for 48 hours to achieve maturation phase, then the treatment group was exposed to 30% javanese turmeric ethanol extract according to the minimum biofilm eradication concentration, the positive control group was exposed to nystatin 100000 IU/ml, and the negative control group wasn't exposed to anything. TEM was used to observe the cellular ultrastructure changes of the *C. albicans* biofilm. Result: The changes observed in the image of cellular ultrastructure of *C. albicans* biofilm treatment group were different cellular shape, different cell wall thicknesses, and damaged organelles.

Conclusion: TEM analysis showed the changes occurred in the image of some cells in *C. albicans* biofilm at maturation phase which has been eradicated by javanese turmeric ethanol extract.