

**PERBEDAAN KADAR PLASMA eNOS DAN EKSPRESI
GEN SCUBE1 SEBAGAI INDIKATOR DISFUNGSI
ENDOTEL PADA PEROKOK
DAN NON-PEROKOK**



TESIS

**Sebagai Salah Satu Syarat untuk Memperoleh Gelar Magister
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ABSTRACT

COMPARISON OF PLASMA eNOS LEVELS AND SCUBE1 GENE EXPRESSION AS INDICATORS OF ENDOTHELIAL DYSFUNCTION IN SMOKERS AND NON-SMOKERS

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Background: Endothelial dysfunction is an early step in atherosclerosis and is closely linked to smoking exposure. Endothelial nitric oxide synthase (eNOS) reflects nitric oxide-dependent vascular homeostasis, whereas signal peptide-CUB-EGF-like domain-containing protein 1 (SCUBE1) is associated with endothelial activation, inflammation, and thrombosis.

Objective: To compare plasma eNOS levels and SCUBE1 expression between smokers and non-smokers.

Methods: A cross-sectional controlled study was conducted at the Biomedical Laboratory, Faculty of Medicine, Universitas Andalas (March-June 2025). Thirty healthy participants were analyzed (15 smokers, 15 non-smokers). Plasma eNOS was measured by ELISA, and SCUBE1 expression was assessed using RT-PCR. Normality was tested using Shapiro-Wilk, group comparisons used Mann-Whitney (eNOS) and independent t-test (SCUBE1).

Results: Plasma eNOS levels did not differ significantly ($p=0.548$) between both group. SCUBE1 expression was normally distributed in both groups ($p=0.354$ and $p=0.306$) and differed significantly between smokers and non-smokers; mean \pm SD SCUBE1 was higher in smokers than non-smokers (4.5 ± 3.1 vs 2.4 ± 1.6 ; $p=0.029$).

Conclusion: Plasma eNOS levels in adult smokers remain comparable to those in non-smokers, indicating that nitric oxide-dependent vascular homeostasis has not shown a significant difference. In contrast, smoking is associated with increased SCUBE1 expression, which points to early endothelial-platelet activation.

Keywords: endothelial dysfunction, smoking, eNOS, SCUBE1, ELISA, RT-PCR

ABSTRAK

PERBEDAAN KADAR PLASMA eNOS DAN EKSPRESI GEN SCUBE1 SEBAGAI INDIKATOR DISFUNGSI ENDOTEL PADA POPULASI PEROKOK DAN NON-PEROKOK

Muhammad Abi Ghoffari Siregar

Latar belakang: Disfungsi endotel merupakan tahap awal aterosklerosis dan berkaitan erat dengan paparan rokok. *Endothelial nitric oxide synthase* (eNOS) menggambarkan jalur vasoprotektif berbasis *nitric oxide*, sedangkan *signal peptide-CUB-EGF-like domain-containing protein 1* (SCUBE1) berhubungan dengan aktivasi endotel, inflamasi, dan trombosis.

Tujuan: Menilai perbedaan kadar plasma eNOS dan ekspresi SCUBE1 pada perokok dan non-perokok.

Metode: Studi *cross-sectional control* dilakukan di Laboratorium Biomedik Laboratorium Biomedik, Fakultas Kedokteran, Universitas Andalas (Maret-Juni 2025). Sebanyak 30 subjek dianalisis (15 perokok, 15 non-perokok). Kadar plasma eNOS diukur dengan ELISA, sedangkan ekspresi SCUBE1 diperiksa dengan RT-PCR. Normalitas diuji dengan *Shapiro-Wilk*, analisis perbedaan menggunakan *Mann-Whitney* (eNOS) dan *independent t-test* (SCUBE1).

Hasil: Kadar eNOS plasma tidak berbeda bermakna antara kedua kelompok ($p=0,548$). Ekspresi SCUBE1 berdistribusi normal pada kedua kelompok ($p=0,354$ dan $p=0,306$) dan berbeda bermakna; rerata \pm SD SCUBE1 pada perokok lebih tinggi dibanding non-perokok ($4,5\pm 3,1$ vs $2,4\pm 1,6$; $p=0,029$).

Kesimpulan: Kadar plasma eNOS pada orang dewasa yang merokok tetap sebanding dengan non-perokok, menunjukkan bahwa homeostasis vaskular yang bergantung pada *nitric oxide* belum mengalami perbedaan bermakna. Sebaliknya, merokok berasosiasi dengan peningkatan ekspresi SCUBE1, yang mengarah pada terjadinya aktivasi endotel-trombosit dini.

Kata kunci: disfungsi endotel, merokok, eNOS, SCUBE1, ELISA, RT-PCR.