



ANALYZING HISTOPATHOLOGY OF *MACACA FASCICULARIS* KIDNEYS WITH *KLEBSIELLA PNEUMONIAE* INFECTION

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**SCHOOL OF VETERINARY MEDICINE AND BIOMEDICAL SCIENCES
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ABSTRAK

CAESARIA RIZKY DANIDA. Analisa Histopathologi Ginjal *Macaca fascicularis* Dengan Infeksi *Klebsiella pneumoniae*. Dibimbing oleh HUDA SHALAHUDIN DARUSMAN and TUTIK WRESDIYATI.

Penelitian ini menganalisis dampak histopatologis infeksi *Klebsiella pneumoniae* pada ginjal *Macaca fascicularis*, sebagai salah satu spesies penting dalam penelitian biomedis. Tiga spesimen yang terinfeksi alami (IA33900, 190517, dan IA3511) dievaluasi menggunakan pewarnaan hematoksin-eosin dengan analisa deskriptif dan analisa kuantitatif. Skoring histopatologi menunjukkan tingkat keparahan kerusakan ginjal yang berbeda: IA33900 menunjukkan lesi moderat (skor 2), sedangkan 190517 dan IA3511 menunjukkan nekrosis dan perdarahan lanjut (skor 3). Temuan umum meliputi degenerasi tubulus, kongesti vaskular, dan infiltrasi inflamasi, sesuai dengan ciri sitotoksitas bakteri dan kerusakan imunomediata. Faktor virulensi strain spesifik, seperti hipervirulen *K. pneumoniae* (hvKp) dengan LPS dan adhesin fimbria, memperburuk kerusakan endotel dan pembentukan mikrotrombi. Peradangan kronis yang dipicu oleh kaskade sitokin Th17/Th2 mendorong fibrosis interstitial dan atrofi tubulus. Analisis kuantitatif menunjukkan peningkatan signifikan indeks dilatasi tubular (TDI) pada ginjal terinfeksi ($P < 0,001$), berkorelasi dengan kerusakan tubulus, sementara rasio glomerulus/kapsul Bowman tidak menunjukkan perbedaan signifikan ($P = 0,83$). Temuan ini menegaskan interaksi antara virulensi bakteri and disregulasi imun inang dalam patologi renal. Studi ini menekankan perlunya terapi target yang menggabungkan eradikasi mikroba and modulasi imun, serta peningkatan manajemen *K. pneumoniae* pada koloni primata SPF untuk menjaga integritas penelitian.

Kata kunci: Histopatologi, Indeks dilatasi tubular, Kerusakan ginjal, *Klebsiella pneumoniae*, *Macaca fascicularis*.

ABSTRACT

CAESARIA RIZKY DANIDA. Analyzing Histopathology of *Macaca fascicularis* kidney with *Klebsiella pneumoniae* Infection. Supervised by HUDA SHALAHUDIN DARUSMAN and TUTIK WRESDIYATI.

This study analyzed the histopathological impact of *Klebsiella pneumoniae* infection on the kidneys of *Macaca fascicularis*, a critical species in biomedical research. Three naturally infected subjects (IA33900, 190517, and IA3511) were evaluated using hematoxylin-eosin (HE) staining and quantitative metrics. Histopathological scoring revealed distinct renal damage severity: IA33900 exhibited moderate lesions (score 2), while 190517 and IA3511 showed advanced necrosis and hemorrhage (score 3). Common findings included tubular degeneration, vascular congestion, and inflammatory infiltration, consistent with bacterial cytotoxicity and immune-mediated damage. Strain-specific virulence factors, such as hypervirulent *K. pneumoniae* (hvKp) with LPS and fimbrial adhesins, exacerbated endothelial injury and microthrombi formation. Chronic inflammation driven by Th17/Th2-polarized cytokine cascades promoted interstitial fibrosis and tubular atrophy. Quantitative analysis demonstrated significant tubular dilatation index (TDI) elevation in infected kidneys ($P < 0.001$), correlating with tubular damage, while glomerular/Bowman's capsule ratios remained unaffected ($P = 0.83$). These findings underscore the interplay between bacterial virulence and host immune dysregulation in renal pathology. The study highlights the need for targeted therapies addressing microbial eradication and immune modulation, as well as improved management of *K. pneumoniae* in SPF primate colonies to safeguard research integrity.

Keywords: Histopathology, *Klebsiella pneumoniae*, *Macaca fascicularis*, Renal damage, Tubular dilatation index.



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Undergraduate thesis
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FOREWORD

First and foremost, I would like to thank God for the good health and well-being that enables me to complete this undergraduate thesis. This study is titled *KIDNEY HISTOPATHOLOGY OF Macaca fascicularis WITH Klebsiella pneumoniae INFECTION*.

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May this work serve as a meaningful contribution to both researchers and practitioners in the field, while advancing scientific knowledge and inspiring future inquiry for the betterment of society

Bogor, July 2025

Caesaria Rizky Danida



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