

## ABSTRACT

**Background:** Nasal irrigation is an adjunct therapy recommended for sinonasal diseases to reduce symptoms and decrease medication usage. The mechanism of nasal irrigation includes physically cleansing particles, reducing inflammation, enhancing mucociliary function, and improving mucosal epithelium. Binahong is a medicinal plant that widely used for its anti-inflammatory effects. This study aims to evaluate the efficacy of combining 2.5% Binahong extract into 0.9% NaCl nasal irrigation for allergic rhinitis patients by examining its impact on mRNA expression levels (IL-4, IL-6, IL-13, and TNF- $\alpha$ ), clinical symptoms, quality of life, and nasal physiological functions.

**Method:** This was an experimental study with a single-blind, randomized controlled parallel group design involving allergic rhinitis patients. Participants were randomly divided into two groups: one receiving 0.9% NaCl nasal irrigation (control) and the other receiving 0.9% NaCl nasal irrigation with 2.5% Binahong extract (treatment), administered twice daily for two weeks. Assessments included mRNA expression (IL-4, IL-6, IL-13, and TNF- $\alpha$ ), clinical symptoms (SNOT-22), quality of life (Mini-RQLQ), and physiological measures such as peak nasal inspiratory flow (PNIF) and mucociliary transport time (MTT) before and after nasal irrigation. Data normality was tested and analyzed using univariate, bivariate and multivariate methods.

**Results:** The combination of 2.5% Binahong extract in 0.9% NaCl nasal irrigation improved the efficacy of primary outcomes (mRNA IL-4, IL-6, and TNF- $\alpha$ ), secondary outcome (SNOT-22, mini-RQLQ) scores, but did not reach statistical significance ( $p > 0.05$ ). Nasal symptom assessment with PNIF showed statistical significance improvement ( $d=11.27$ , 95% CI = -0.31-22.85,  $p= 0.028$ ). There was a significant effect of Binahong therapy in allergic rhinitis moderate-severe vs mild classification ( $p= 0.004$ ).

**Conclusion:** The combination of 2.5% Binahong extract in 0.9% NaCl nasal irrigation showed a trend toward improvement in inflammatory biomarkers, significantly improved nasal obstruction symptoms in moderate-severe allergic rhinitis classification.

**Keywords:** sodium chloride, quality of life, mucociliary clearance, inflammatory mediators, Binahong extract.

## INTISARI

**Latar Belakang:** Cuci hidung merupakan salah satu terapi tambahan yang direkomendasikan pada penyakit sinonasal untuk menurunkan gejala dan mengurangi pemakaian obat-obatan. Mekanisme kerja cuci hidung secara fisik membersihkan partikel, mengurangi peradangan, meningkatkan fungsi mukosilia, dan memperbaiki epitel mukosa. Binahong merupakan tanaman obat yang banyak digunakan dengan memanfaatkan efek antiinflamasi. Tujuan penelitian ini adalah untuk mengetahui pengaruh kombinasi ekstrak Binahong 2,5% terhadap daya guna cuci hidung NaCl 0,9% pada penderita rinitis alergi melalui penilaian ekspresi mRNA (IL-4, IL-6, IL-13, dan TNF- $\alpha$ ), gejala klinis, kualitas hidup, dan fungsi fisiologis hidung.

**Metode:** Penelitian eksperimen dengan rancangan uji klinis acak terkendali grup paralel buta-tunggal pada subyek penderita rinitis alergi. Partisipan secara acak dibagi dalam 2 kelompok yaitu diberikan cuci hidung NaCl 0,9% (kontrol) dan cuci hidung NaCl 0,9% dengan ekstrak Binahong 2,5% (perlakuan) sehari 2 kali selama 2 minggu. Pemeriksaan ekspresi mRNA (IL-4, IL-6, IL-13, dan TNF- $\alpha$ ), gejala klinis (SNOT-22), kualitas hidup (Mini-RQLQ), dan fisiologis *peak nasal inspiratory flow* (PNIF), *mucociliary transport time* (MTT) dilakukan sebelum dan sesudah cuci hidung. Data diuji normalitas, dianalisis secara univariat, bivariat dan multivariat.

**Hasil:** Kombinasi ekstrak Binahong 2,5% pada cuci hidung NaCl 0,9% meningkatkan daya guna pada luaran primer (ekspresi mRNA IL-4, IL-6, TNF- $\alpha$ ), luaran sekunder (SNOT-22, mini-RQLQ) namun tidak bermakna secara statistik ( $p > 0,05$ ). Gejala hidung tersumbat berdasarkan PNIF menunjukkan perbaikan yang bermakna secara statistik ( $d = 11,27$ , 95% CI = -0,31-22,85,  $p = 0,028$ ). Terdapat perbedaan signifikan efek terapi Binahong pada rinitis alergi sedang-berat dibandingkan dengan rhinitis alergi ringan ( $p = 0,044$ ).

**Kesimpulan:** Kombinasi ekstrak Binahong 2,5% pada cuci hidung NaCl 0,9% menunjukkan tren perbaikan *biomarker* inflamasi, secara signifikan mengurangi gejala hidung tersumbat pada kelompok penderita rhinitis alergi sedang-berat.

**Kata Kunci:** *sodium chloride*, kualitas hidup, *mucociliary clearance*, mediator inflamasi, ekstrak Binahong.