INTISARI

Latar Belakang: Matriks metalloproteinase-9 (MMP-9) berperan penting dalam degradasi jaringan dan progresivitas kerusakan periapikal sehingga penghambatan ekspresinya menjadi target terapeutik potensial. Bawang putih (*Allium sativum L.*) mengandung senyawa bioaktif organosulfur yang bekerja melalui jalur NF-κB dan berpotensi menurunkan ekspresi MMP-9. **Tujuan:** menganalisis pengaruh gel ekstrak bawang putih (GEB) 20% serta lama paparan terhadap ekspresi MMP-9 pada kerusakan jaringan periapikal tikus *Sprague Dawley*. **Metode:** *true experimental laboratory* dengan *post-test only control group*. Sampel 27 gigi molar atas kanan dan kiri tikus *Sprague Dawley*, dilakukan perforasi kamar pulpa dan injeksi LPS *E.coli,* serta dibiarkan 3 hari untuk menginduksi kerusakan jaringan periapikal. Terdapat 9 kelompok berdasarkan jenis perlakuan (basis gel, gel ekstrak bawang putih 20%, dan *triple antibiotic paste*/TAP) serta lama paparan (hari ke-5, 7, dan 14). Ekspresi MMP-9 dievaluasi secara imunohistokimia, dikuantifikasi menggunakan *ImageJ* dan dianalisis dengan *Two-Way ANOVA* serta uji *post hoc* LSD ($\alpha = 0{,}05$). **Hasil:** GEB 20% signifikan menurunkan ekspresi MMP-9 dibanding kontrol negatif ($p < 0{,}05$). Ekspresi MMP-9 tertinggi hari ke-5 selanjutnya menurun hari ke-14 pada semua kelompok serta terendah pada kontrol positif dan GEB 20%. **Kesimpulan**: GEB 20% mampu menurunkan ekspresi MMP-9 pada kerusakan jaringan periapikal tikus *Sprague Dawley*. Ekspresi MMP-9 tertinggi pada lama paparan hari ke-5 dan menurun pada hari ke-14.

Kata Kunci : gel ekstrak bawang putih (GEB) 20%, MMP-9, lama paparan, kerusakan periapikal

ABSTRACT

Background: Matrix metalloproteinase-9 (MMP-9) is a key enzyme in extracellular matrix degradation and contributes to the progression of periapical lesions. Its inhibition is considered a potential therapeutic strategy. Garlic (*Allium sativum L.*), rich in organosulfur bioactive compounds, is known to modulate inflammation via NF-κB signaling and may reduce MMP-9 expression. **Objectives:** This study investigated the effect of 20% garlic extract gel (GEB) and exposure duration on MMP-9 expression in periapical tissue destruction of *Sprague Dawley* rats. **Method:** A true experimental laboratory design with a post-test only control group was employed. Periapical destruction were induced through pulpal perforation and intrapulpal injection of *E. coli* lipopolysaccharide (LPS), followed by a 3-day latency period to establish tissue destruction. Twenty-seven maxillary molars were assigned to nine groups based on treatment (gel base, GEB 20% and triple antibiotic paste/TAP) and exposure duration (days 5, 7, and 14). MMP-9 expression was evaluated immunohistochemically and quantified using ImageJ. Data were analyzed with *Two-Way ANOVA* and LSD *post hoc* test ($\alpha = 0.05$). **Results:** GEB 20% significantly reduced MMP-9 expression compared with the negative control ($p < 0.05$). MMP-9 expression was highest on day 5 then decreased on day 14 in all groups and the lowest observed in the positive control and GEB 20%. **Conclusion:** GEB 20% effectively downregulates MMP-9 expression in periapical tissue destruction of *Sprague Dawley* rats. MMP-9 expression was highest on day 5 and decreased on day 14.

Keywords: garlic extract gel (GEB) 20%, MMP-9, exposure duration, periapical tissue destruction