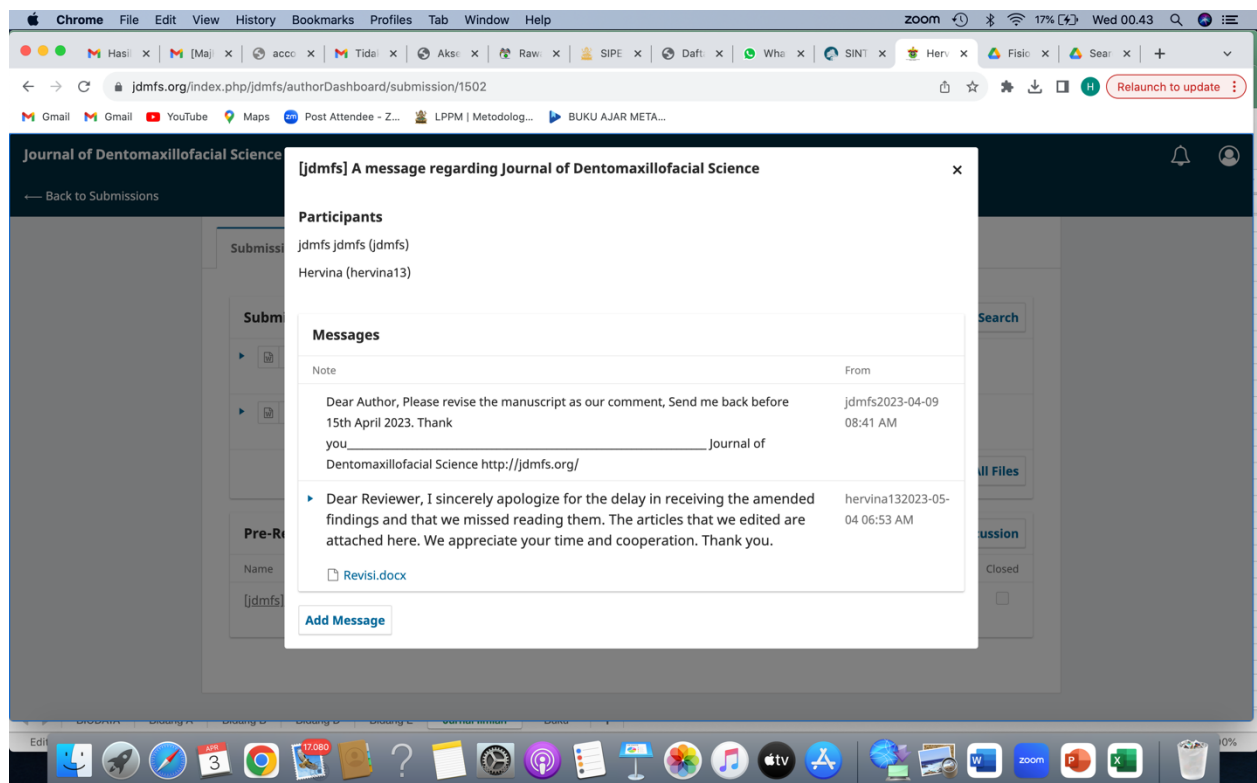
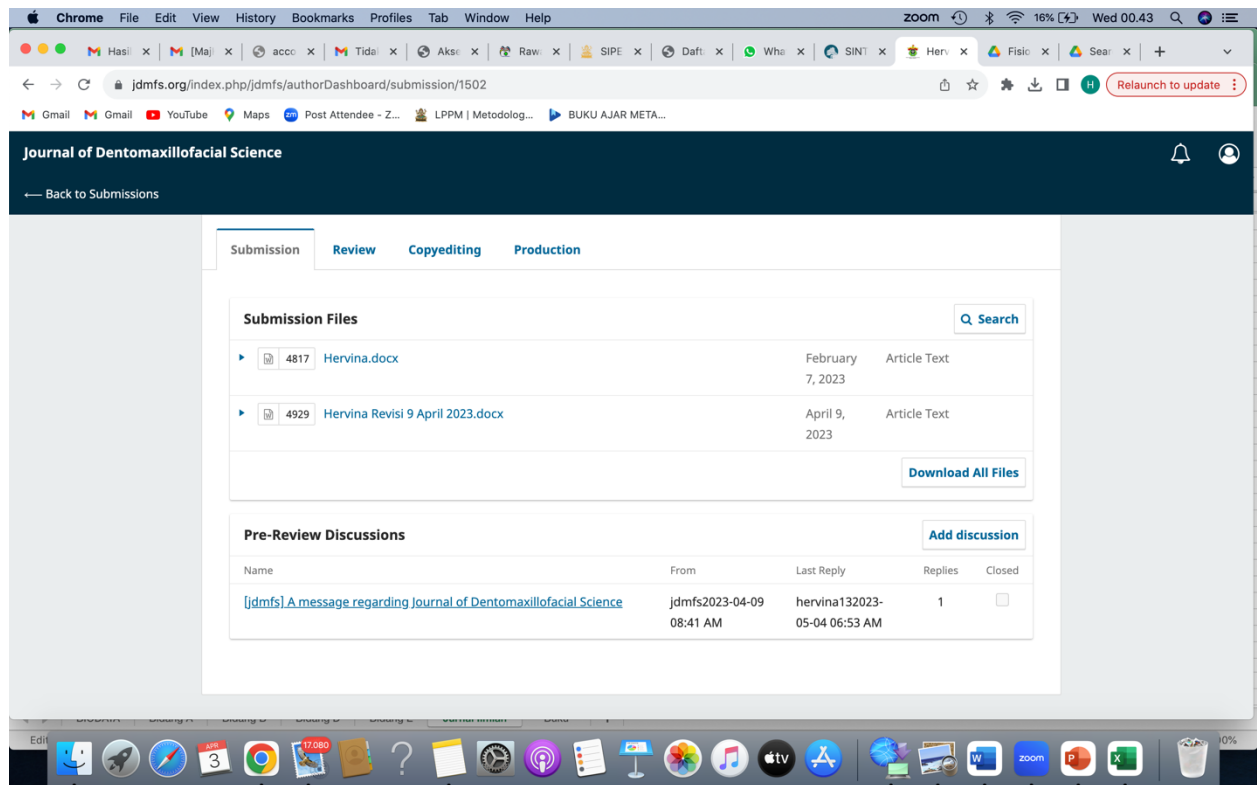




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Anti-Osteoclastogenesis Effects of Gambir Extract Gel in Periodontitis

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Table 2. The Significant Differences in RANKL's Mean Between Two Groups

Group	Mean Differences	p
Group 1 and Group 2	0.040	0.013*
Group 1 and Group 3	0.038	0.018*
Group 1 and Group 4	0.032	0.041*
Group 2 and Group 3	-0.013	0.997
Group 2 and Group 4	-0.008	0.619
Group 3 and Group 4	-0.006	0.828

*significant differences

OPG

The significance analysis of the *One Way Anova Welch* test results showed $H = 13.792$ and $p = 0.001$. This suggests that there are differences in the four groups' means of RANKL ($p \leq 0.05$). The groups with differences were found using the *Gomes-Hewell* test (table 3). The OPG serum level in group 4 higher and has significant differences than in group 1.

Table 3. The Significant Differences in OPG Mean's Between Two Groups

Group	Mean Differences	p
Group 1 and Group 2	-0.187	0.075
Group 1 and Group 3	-0.286	0.053
Group 1 and Group 4	-0.370	0.015*
Group 2 and Group 3	-0.986	0.746
Group 2 and Group 4	-0.182	0.274
Group 3 and Group 4	-0.084	0.864

*significant differences

Osteoblast

The significance analysis of *Kruskal-Wallis* data on the number of osteoblasts showed $p = 0.004$. This indicates that the mean number of osteoblasts in the four groups differs ($p \leq 0.05$). The *Mann-Whitney U* Test was employed as a post hoc analysis (table 4). The number of osteoblast in group 1 was significantly less than in group 4, whereas the number of osteoblast in group 2 was significantly more than in group 3.

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TABLES

Table 1. The Mean Value of RANKL, OPG Serum Level and The Number of Osteoblast and Osteoclast

Research Group	RANKL Serum Level	OPG Serum Level	The Number of Osteoblast	The Number of Osteoclast
Group I	0.070±0.020	0.165±0.125	1.16±0.40	4.33±1.50
Group II	0.030±0.009	0.353±0.139	2.33±1.21	1.83±0.98
Group III	0.031±0.014	0.452±0.192	0.33±0.51	3.33±1.63
Group IV	0.038±0.012	0.536±0.182	1.33±1.03	1.50±0.83

Table 2. The Significant Differences in RANKL's Mean Between Two Groups

Group	Mean Differences	p
Group 1 and Group2	0,040	0,013*
Group 1 and Group 3	0,038	0,018*
Group 1 and Group 4	0,032	0,041*
Group 2 and Group 3	-0,013	0,997

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survival, proliferation, differentiation, and mineralization. In vitro, catechin can increase osteoclast apoptosis, reduce osteoclastogenesis, and prevent bone resorption. Pre-osteoclasts and osteoclasts can be affected directly or indirectly by altering how MSCs and stromal cells control pre-osteoclasts. Through a Fenton reaction, EGCG treatments have been found to enhance the death of multinucleated cells that resemble osteoclasts while sparing osteoblasts. By preventing MMP-9 production in osteoblasts and osteoclastogenesis, catechin may reduce alveolar bone resorption in periodontal diseases^{20,24,25}.

CONCLUSION(s)

Gambir Extract gel 10% has anti-osteoclastogenesis effects via decreased RANKL and raised OPG serum levels, as well as increased osteoblast and decreased osteoclast number.

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catechin may reduce alveolar bone resorption in periodontal diseases^{18,22,23,24}.

Conclusion
Gambir Extract gel 10% has anti-osteoclastogenesis effects via decreased RANKL and raised OPG serum levels, as well as increased osteoblast and decreased osteoclast number.

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Conflict of interest
The authors declare no conflicts of interest

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