

# Phytochemical Screening and Pharmacological Profiling of Mabolo (*Diospyros Blancoi*) Leaves and Stem Extract for Potential Therapeutic Application in Dermatology

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## Abstract

Dermatological conditions such as acne, eczema, and microbial infections remain prevalent, prompting interest in safer plant-based alternatives. *Diospyros blancoi* has traditional dermatological uses but limited scientific validation. This study evaluated the phytochemical composition and pharmacological potential of Mabolo leaf and stem extracts for dermatological applications. Extracts were subjected to phytochemical screening and assessed for antioxidant (DPPH, ABTS, FRAP), anti-inflammatory (protein denaturation inhibition and membrane stabilization), and antimicrobial activities (agar diffusion, MIC, and MBC/MFC) against *Staphylococcus aureus* and *Staphylococcus epidermidis*. Statistical analyses included ANOVA and correlation tests at 0.05 significance level. The extracts contained flavonoids, tannins, saponins, terpenoids, and phenolics, which contributed to significant concentration-dependent antioxidant activity, notable anti-inflammatory effects, and antimicrobial inhibition. Statistical analysis showed significant differences among biological activities ( $F = 24.2054$ ,  $p < 0.001$ ) and varying correlations between antioxidant and pharmacological effects. Mabolo extracts exhibited significant antioxidant, anti-inflammatory, and antibacterial properties, supporting *Diospyros blancoi* as a promising natural candidate for dermatological and cosmeceutical applications.

**Keywords:** mabolo, phytochemical analysis, antioxidant properties, anti-inflammatory effects, antimicrobial activity, dermatological applications

## Introduction

Dermatological conditions such as acne, eczema, and microbial infections remain prevalent worldwide and often require prolonged treatment, which may result in adverse effects including antimicrobial resistance, skin irritation, and systemic complications (Mendoza et al., 2024; Tabassum & Hamdami, 2024). These limitations have driven increasing interest in plant-based alternatives that offer safer and more sustainable therapeutic options. *Diospyros blancoi* (Mabolo), a plant indigenous to the Philippines, has been traditionally used to treat various skin disorders, suggesting its potential as a source of bioactive compounds. Guided by ethnopharmacological theory, which posits that plants with long-standing traditional use are likely to contain pharmacologically active constituents (Heinrich & Gibbons, 2001), this study explores the scientific basis of Mabolo's dermatological applications. Previous studies on the *Diospyros* genus have identified bioactive compounds such as flavonoids, tannins, and terpenoids with

antioxidant, anti-inflammatory, and antimicrobial properties (Fankum et al., 2025). However, current literature on *D. blancoi* remains fragmented and lacks a comprehensive evaluation linking its phytochemical composition to dermatological pharmacological activities. This study aimed to identify the phytochemical constituents of Mabolo leaf and stem extracts, evaluate their antioxidant, anti-inflammatory, and antimicrobial activities, and determine the relationship between antioxidant capacity and pharmacological effects, with the hypothesis that no significant relationship exists between these variables.

## Methods

This study utilized an experimental research design to evaluate the phytochemical and pharmacological properties of *Diospyros blancoi* leaf and stem extracts. Fresh plant materials were collected, authenticated, and subjected to hydroethanolic extraction to isolate bioactive compounds. The extracts underwent qualitative phytochemical screening to identify the presence of secondary metabolites such as flavonoids, tannins, saponins, terpenoids, and phenolic compounds. Antioxidant activity was assessed using DPPH radical scavenging, ABTS assay, and ferric reducing antioxidant power (FRAP) methods to determine free radical neutralization capacity. Anti-inflammatory activity was evaluated through inhibition of protein denaturation and membrane stabilization assays, which measure the ability of the extracts to prevent inflammatory processes at the cellular level. Antimicrobial activity was determined using agar diffusion, minimum inhibitory concentration (MIC), and minimum bactericidal concentration (MBC) assays against *Staphylococcus aureus* and *Staphylococcus epidermidis*. Statistical analysis was conducted using analysis of variance (ANOVA) and Pearson correlation to assess significant differences and relationships among variables at a 0.05 level of significance, with post hoc Tukey tests applied where appropriate.

## Results

The results revealed that Mabolo leaf and stem extracts contain a diverse range of phytochemical constituents, including flavonoids, tannins, saponins, terpenoids, and phenolic compounds, indicating a rich bioactive profile. The extracts exhibited significant antioxidant activity across DPPH, ABTS, and FRAP assays, demonstrating a concentration-dependent increase in free radical scavenging capacity comparable to standard antioxidants. In terms of anti-inflammatory activity, the extracts showed notable inhibition of protein denaturation and effective membrane stabilization, suggesting their potential to reduce inflammatory responses. The antimicrobial assays demonstrated that the extracts possessed inhibitory effects against *Staphylococcus aureus* and *Staphylococcus epidermidis*, with measurable zones of inhibition and defined MIC and MBC values, indicating both bacteriostatic and bactericidal properties. Statistical analysis revealed a significant difference among antioxidant, anti-inflammatory, and antimicrobial activities, as evidenced by ANOVA results ( $F = 24.2054$ ,  $p < 0.001$ ). Furthermore, Pearson correlation analysis indicated varying but meaningful relationships between antioxidant activity and the observed pharmacological effects.

## Discussion

The findings of this study demonstrate that *Diospyros blancoi* leaf and stem extracts possess significant pharmacological activities that support their potential use in dermatological applications. The presence of flavonoids and phenolic compounds likely contributed to the strong antioxidant activity observed, consistent with previous studies highlighting the role of polyphenols in neutralizing free radicals and

protecting skin cells from oxidative stress (Michalak, 2022). The anti-inflammatory effects, as evidenced by protein denaturation inhibition and membrane stabilization, align with existing literature indicating that plant-derived compounds can effectively modulate inflammatory responses (Banerjee et al., 2024). Additionally, the antimicrobial activity observed against *Staphylococcus aureus* and *Staphylococcus epidermidis* supports prior findings that phytochemicals such as tannins and terpenoids exhibit antibacterial properties (Mostafa et al., 2021). The statistically significant differences among the evaluated biological activities suggest that the extracts exhibit broad-spectrum pharmacological effects. Moreover, the observed correlations between antioxidant activity and other pharmacological responses indicate that antioxidant mechanisms may play a contributory role in mediating anti-inflammatory and antimicrobial effects. However, the relationship is not entirely linear. These findings partially reject the null hypothesis and reinforce the importance of phytochemical composition in determining biological activity.

## Conclusion

In conclusion, *Diospyros blancoi* leaf and stem extracts exhibit significant antioxidant, anti-inflammatory, and antimicrobial activities, supported by a diverse phytochemical profile. These results provide scientific validation for the traditional use of Mabolo in dermatological applications and highlight its potential as a natural source of therapeutic agents. However, the study is limited by its *in vitro* design, absence of toxicity and clinical evaluation, and restriction to specific plant parts. Future research should focus on *in vivo* studies, safety assessment, and formulation development to further establish its efficacy and applicability in dermatological and cosmeceutical products. Overall, this study underscores the potential of Mabolo as a promising, safe, and sustainable plant-based alternative in pharmaceutical and dermatological research.

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