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Unveiling antioxidant arsenal DPPH radical scavenging activity and flavonoid profiles of six edible flower infusions

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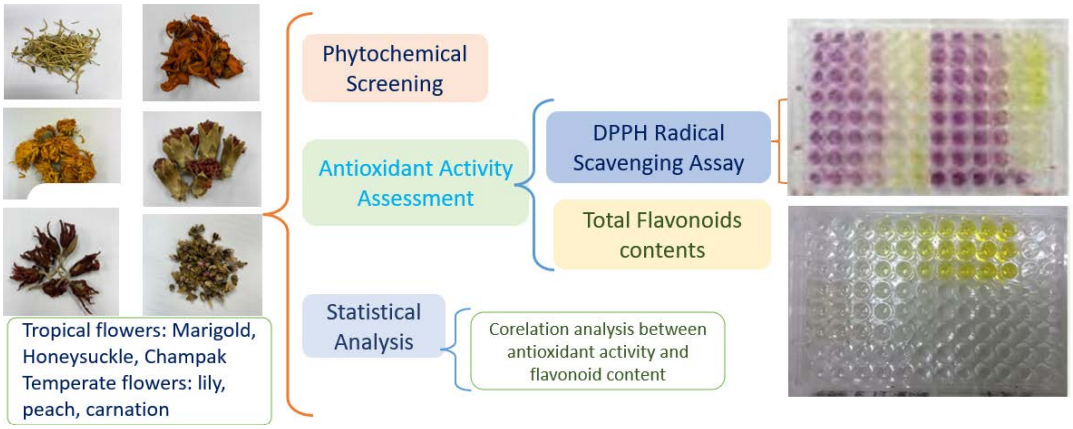

ABSTRACT

Free radicals contribute to the onset of various diseases, including aging, cancer, and cardiovascular conditions. The body mitigates free radicals through enzymatic synthesis of antioxidants and dietary intake of antioxidants such as vitamin E and flavonoids. This study investigated the antioxidant activity and total flavonoid content of aqueous extracts from six edible flowers: tropical species (marigold, honeysuckle, champaka) and temperate species (lily, peach, carnation). Phytochemical screening, DPPH radical scavenging assays, and total flavonoid quantifications were conducted. All extracts contained flavonoids and tannins, with carnation exhibiting the most diverse phytochemical profile. Champaka demonstrated the strongest antioxidant activity (IC50 = 43.33 ± 7.31 µg/mL), while carnation had the highest total flavonoid content (1795.90 ± 120.01 mg quercetin equivalent/g extract). Tropical flowers generally displayed stronger antioxidant activities, whereas temperate flowers exhibited higher flavonoid contents. However, no statistically significant correlation was observed between antioxidant activity and flavonoid content across all extracts ($p > 0.05$). These findings underscore the complexity of relationships between phytochemical composition and antioxidant potential, highlighting edible flowers as valuable natural antioxidant sources. Comprehensive phytochemical profiling and multi-assay approaches are crucial for evaluating plant-based antioxidant properties.

Keywords: Edible flowers, antioxidant activity, flavonoids, DPPH, phytochemical screening

INTRODUCTION

Free radicals are highly reactive molecules that play a significant role in the pathogenesis of numerous diseases, including cancer, cardiovascular disorders, and age-related degenerative conditions.[1] These unstable molecules can cause oxidative stress, leading to cellular damage and dysfunction. The human body possesses intrinsic antioxidant defense mechanisms to neutralize these harmful species, primarily through the synthesis of endogenous antioxidant enzymes and the absorption of exogenous antioxidants from dietary sources.[2]

In recent years, there has been a growing interest in natural antioxidants, particularly those derived from plant sources, due to their potential health benefits and lower risk of side effects compared to synthetic alternatives.[3] Edible flowers have gained popularity as a source of natural antioxidants, with many consumers incorporating them into their diets in the form of teas and infusions. These flowers contain various bioactive compounds, including flavonoids, which are known for their potent antioxidant properties.[4]

Flavonoids, a class of polyphenolic compounds, are ubiquitous in plants and have been extensively studied for their diverse biological activities. Their antioxidant capacity is attributed to their ability to scavenge free radicals, chelate metal ions, and modulate cellular antioxidant defense systems. [5] The presence of flavonoids

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in edible flowers suggests that these natural products may offer significant health-promoting effects, including cardioprotective, anti-inflammatory, and anticancer properties.[6]

Among the methods used to evaluate antioxidant activity, the 2,2-diphenyl-1-picrylhydrazyl (DPPH) assay is widely employed due to its simplicity, rapidity, and reproducibility. [7] This method assesses the free radical scavenging ability of antioxidants by measuring the reduction of the stable DPPH radical. Additionally, the quantification of total flavonoid content provides valuable information about the potential antioxidant capacity of plant extracts.[8]

The present study aims to investigate the phytochemical profiles, antioxidant activities, and total flavonoid content of aqueous extracts from six edible flowers: champaka (*Michelia champaca*), marigold (Tagetes spp.), honeysuckle (*Lonicera spp.*), lily (*Lilium spp.*), carnation (*Dianthus caryophyllus*), and peach blossom (Prunus persica). These flowers were selected to represent both tropical and temperate varieties, allowing for a comparative analysis of their bioactive properties. By employing phytochemical screening, the DPPH method to assess antioxidant activity, and spectrophotometric techniques to determine total flavonoid content, this research seeks to provide comprehensive insights into the potential health benefits of these floral infusions.

Furthermore, this study aims to elucidate the relationship between flavonoid content and antioxidant activity in these edible flower extracts, contributing to the growing body of knowledge on natural antioxidants. The findings of this research may have significant implications for the development of nutraceuticals, functional foods, and natural preservatives derived from edible flowers.

MATERIALS AND METHODS

Chemicals and reagents

2, 2-diphenyl-1-picryl-hydrazyl (DPPH) were obtained from Sigma Chemicals Co. (St. Louis, MO, USA). Quercetin and Vitamin C were obtained from Sigma-Aldrich Co., St. Louis, USA. All other basic reagents were of analytical grade.

Preparation of Aqueous Extracts from Edible Flowers

Six types of edible flowers were selected for this study: marigold (*Tagetes spp.*), honeysuckle (*Lonicera spp.*), lily (*Lilium spp.*), peach blossom (*Prunus persica*), carnation (*Dianthus caryophyllus*), and champaka (*Michelia champaca*). Commercial dried flower tea samples of each species were obtained and finely ground using a laboratory mill (IKA A11 basic, Staufen, Germany) to ensure homogeneity and increase the surface area for extraction.

The aqueous extraction was performed using a hot water infusion method. For each flower sample, a ratio of 1:10 (w/v) was maintained, with 1 g of ground flower material added to 10 mL of boiling deionized water. The mixture was allowed to infuse for 20 minutes at 100°C with occasional stirring to ensure uniform extraction. This extraction time and temperature were chosen based on previous optimization studies for maximum phenolic and flavonoid extraction from plant materials.[9]

Following infusion, the hot extracts were left to cool down to room temperature, then further clarified by centrifugation at 3,000 x g for 15 minutes at 4°C to remove any remaining fine particles. The supernatants were carefully decanted and stored in amber glass bottles at -20°C until further analysis to prevent degradation of bioactive compounds.

These aqueous extracts were used for subsequent analyses, including the determination of total flavonoid content and antioxidant activity assessment using the DPPH method.

Phytochemical Screening of Plant Extracts

A comprehensive phytochemical screening was conducted to identify the chemical constituents present in these extracts. The screening procedures followed established protocols outlined by Trease and Evans.[10] The phytochemical analysis revealed the presence of various bioactive compounds, including flavonoids, saponins, tannins, alkaloids, steroids, terpenoids, coumarins, anthraquinones, cardiac glycosides, phenols, glycosides, protein and fat & oil.

Anti-oxidant assay of aqueous crude extract

The antioxidant activity of the edible flower extracts was assessed using the 2,2-diphenyl-1-picrylhydrazyl (DPPH) free radical scavenging assay, following the method described by Powthong *et al.* [11] with slight modifications. Flower extracts were prepared in methanol at various concentrations ranging from 6.25 to 100 µl/100 µL. The DPPH solution was prepared by dissolving DPPH (Sigma-Aldrich, St. Louis, MO, USA) in methanol to achieve a final concentration of 0.2 mM.

For the assay, 100 µL of each extract concentration was mixed with an equal volume of the methanolic DPPH solution in a 96-well microplate. The reaction mixture was shaken vigorously and incubated in the dark at room temperature for 30 minutes. Following incubation, the absorbance was measured at 517 nm using a spectrophotometer. A control reaction was prepared by replacing the extract with an equivalent volume of distilled water. All measurements were performed in triplicate.

The DPPH radical scavenging activity was calculated using the following equation:

DPPH scavenging effect (%) = $[1-(A_1 / A_0)] \times 100$

Where A_0 represents the absorbance of the control reaction and A_1 represents the absorbance in the presence of the sample. The half-maximal effective concentration (EC_{50}) value, defined as the concentration of extract required to scavenge 50% of the DPPH radicals, was determined for each flower extract using a dose-response curve. To express the antioxidant capacity in terms of a standard antioxidant, a calibration curve was established using L-ascorbic acid (vitamin C) as a reference compound. The total antioxidant content was calculated based on this calibration curve and expressed as µg of vitamin C equivalent (VCEAC).

Total flavonoids colorimetric assay

Flower extracts were prepared by dissolving the dried samples in methanol to achieve concentrations ranging from 6.25 –100 µL/ 100 µL. The total flavonoid content was determined using the aluminum chloride colorimetric method as described by Mimica-Dukić *et al.* [12] with slight modifications. Briefly, 30 µL of each extract was transferred to a 96-well microtiter plate. To this, 170 µL of 10% aluminum chloride ($AlCl_3$) reagent was added. The plate was then incubated at room temperature for 30 minutes to allow for complex formation. Following incubation, the absorbance was measured at 415 nm using a spectrophotometer, with methanol serving as the blank. Quercetin was used as the standard, with a

stock solution prepared at 0.1 mg/mL. A calibration curve was constructed using quercetin concentrations ranging from 1 to 1,000 µg/mL. The total flavonoid content was calculated from the calibration curve and expressed as µg of quercetin equivalent (QE).

Statistical Analysis

All experimental results were carried out in triplicate and were expressed as mean ± SD (standard deviation). One-Way ANOVA and LSD test were used to analyze significant differences ($p<0.05$) using the SPSS version 23.

RESULTS AND DISCUSSION

This comprehensive study on the antioxidant activity and total flavonoid content of aqueous extracts from six edible flowers, encompassing both tropical and temperate varieties, has yielded significant insights into their phytochemical profiles and potential health benefits. The investigation employed multiple analytical techniques, including preliminary phytochemical screening, DPPH radical scavenging assay, and total flavonoid content determination, to provide a holistic understanding of these floral extracts.

Preliminary phytochemical screening of the aqueous extracts from six edible flowers revealed a diverse array of bioactive compounds (Table 1). All six flower extracts consistently demonstrated the presence of flavonoids and tannins, which are well-known for their potent antioxidant properties. [13]

Table 1. The major phytochemical groups of edible flower

Phytoc hemical	Peach	Canation	Lily	Marigold	Honey suckle	Champaka
Flavonoid	+	+	+	+	+	+
Saponin	-	+	+	+	-	-
Tannin	+	+	+	+	+	+
Alkaloid	+	+	+	-	-	+
Steroids	-	-	-	-	-	-
Terpenoids	-	-	-	-	-	+
Coumarin	-	+	+	+	+	+
Anthraquinone	-	+	-	-	-	-
Cardiac glycosides	-	+	-	-	-	-
Phenols	-	-	-	-	-	+
Glycosides	-	-	-	-	-	-
Protein	-	+	+	+	-	+
Fat & oil	-	-	-	-	-	-

Note: + denotes the presence of the compound and - the absence of the compound

The aqueous extract of carnation exhibited the most diverse phytochemical profile, containing flavonoids, tannins, alkaloids, coumarins, anthraquinones, cardiac glycosides, and ninhydrin-positive compounds. This rich composition suggests that carnation may possess a wide range of biological activities beyond antioxidant properties, warranting further investigation into its potential therapeutic applications. [14]

Peach flower extract showed the presence of flavonoids, saponins, tannins, and alkaloids. The combination of these compounds, particularly flavonoids and tannins, may contribute synergistically to the extract's antioxidant capacity. [15]

Lily and marigold extracts shared similar phytochemical profiles, containing flavonoids, saponins, tannins, coumarins, and ninhydrin-positive compounds. The presence of saponins in these extracts is noteworthy, as they have been reported to exhibit various biological activities, including antioxidant and anti-inflammatory effects. [16]

Honeysuckle extract demonstrated a relatively simpler composition, with flavonoids, tannins, and coumarins detected. Despite its less complex profile, honeysuckle has been traditionally used for its medicinal properties, and these compounds may contribute to its reported health benefits. [17]

Interestingly, champaka extract revealed a unique phytochemical fingerprint among the studied flowers, being the only one to contain terpenoids and phenols in addition to flavonoids, tannins, alkaloids, coumarins, and proteins. This diverse composition suggests that champaka may possess a broader spectrum of biological activities, potentially making it a valuable subject for further pharmacological studies.[18]

The consistent presence of flavonoids across all flower extracts is particularly significant, as these compounds are renowned for their strong antioxidant activities and have been associated with various health-promoting effects, including cardioprotective, anti-inflammatory, and anticancer properties.[6] Similarly, the ubiquitous presence of tannins in all extracts is noteworthy, as these polyphenolic compounds have been shown to exhibit antioxidant, antimicrobial, and anti-inflammatory activities. [19]

Regarding to comparative analysis of the phytochemical profiles between Tropical Flowers Group (marigold, honeysuckle, champaka) and Temperate Flowers (lily, peach, and carnation. Saponins are more prevalent in the temperate flower group, being present in lily and peach extracts. In the tropical group, only marigold contains saponins. This difference might be related to the adaptive mechanisms of plants in different climates.[16] While alkaloids are more common in the temperate flower group, found in lily, peach, and carnation extracts. In the tropical group, only champaka contains alkaloids. This variation could be attributed to different defense mechanisms developed by plants in their respective environments.[20] Coumarins are ubiquitous in the tropical flower group but less consistent in the temperate group. All tropical flowers contain coumarins, while only lily from the temperate group shows their presence. Coumarins are known for their diverse biological activities, including antioxidant properties.[21] However, the temperate flower group shows some unique compounds not found in the tropical group. For instance, carnation contains anthraquinones and cardiac glycosides, while peach also has cardiac glycosides. These compounds might contribute to specific medicinal properties of these flowers.[14]

Conversely, champaka from the tropical group is the only flower containing terpenoids and phenols, suggesting potential unique bioactivities.[18]

While both groups share some common phytochemicals like flavonoids and tannins, there are notable differences in their overall phytochemical profiles. The temperate flower group tends to have a more diverse array of compounds, including unique ones like anthraquinones and cardiac glycosides. The tropical flower group, while having a somewhat simpler profile, shows consistency in certain compounds like coumarins across all samples. These differences likely reflect the distinct evolutionary paths and

environmental adaptations of these plants in their respective climates.

These findings underscore the importance of considering geographical origin and climate in the study of medicinal plants and their potential therapeutic applications. Further quantitative analysis and bioactivity studies would be beneficial to fully understand the implications of these phytochemical differences.

The present study evaluated the antioxidant activity and total flavonoid content of aqueous extracts from six edible flowers, encompassing both tropical and temperate varieties. The results, as presented in Table 2, reveal notable variations in antioxidant potency and flavonoid content among the examined floral extracts.

Table 2 IC_{50} Values and for anti-oxidant activities by edible flower. Data are given as Mean ± SEM (n=3).

Extract	IC_{50} Values for DPPH inhibition ± SEM (µg /mL)	Total antioxidant (µg Vitamin C equivalents/)
Peach	279.89±37.30	90.73±5.72
Carnation	88.39±0.58	102.10±11.81
Lily	87.31±0.82	37.73±12.17
Marigold	60.80±2.55	71.49±8.73
honeysuckle	70.19±30.47	126.62±4.32
Champaka	43.33±7.31	81.47±5.72

Among the tropical flowers, Champaka (*Michelia champaca*) exhibited the most potent antioxidant activity, with the lowest IC_{50} value of 43.33±7.31 µg/mL for DPPH inhibition. This was followed by Marigold (*Tagetes spp*.) and Honeysuckle (*Lonicera spp*.) with IC_{50} values of 60.80±2.55 µg/mL and 70.19±30.47 µg/mL, respectively. The strong antioxidant activity of Champaka aligns with previous studies that have reported high levels of phenolic compounds and flavonoids in this species.[22] Marigold's notable antioxidant capacity corroborates findings by Gong *et al.*[23], who identified various bioactive compounds, including lutein and quercetin derivatives, contributing to its antioxidant properties.

In the temperate flowers group, Lily (*Lilium spp*.) and Carnation (*Dianthus caryophyllus*) demonstrated comparable antioxidant activities, with IC_{50} values of 87.31±0.82 µg/mL and 88.39±0.58 µg/mL, respectively. Peach (*Prunus persica*) flowers exhibited the lowest antioxidant activity among all samples, with an IC_{50} value of 279.89±37.30 µg/mL. These results are consistent with a study by Chen *et al.*[24], which reported moderate antioxidant activity in various Lilium species due to the presence of flavonoids and phenolic acids.

Interestingly, the total antioxidant capacity, expressed as µg Vitamin C equivalents per 0.01 g dry matter, did not always correlate directly with the DPPH inhibition results. Honeysuckle, despite its moderate IC_{50} value, showed the highest total antioxidant capacity (126.62±4.32 µg Vitamin C equivalents/0.01 g dry matter). This discrepancy might be attributed to the presence of specific antioxidant compounds that react differently in the DPPH assay compared to the total antioxidant capacity assay, as suggested by Prior *et al.*[25]

Comparing the tropical and temperate flower groups, it is evident that the tropical flowers generally exhibited stronger antioxidant activities. The average IC_{50} value for tropical flowers (58.11 µg/mL) was considerably lower than that of temperate flowers (151.86 µg/mL), indicating higher antioxidant potency. This trend could be attributed to the higher exposure to environmental stressors, such as intense sunlight and elevated temperatures, in tropical regions, which may induce the production of more potent antioxidant compounds as a protective mechanism. [26]

The total flavonoid content, as reflected in the total antioxidant capacity results, showed variations within and between the tropical and temperate groups. Honeysuckle from the tropical group and Carnation from the temperate group demonstrated the highest total antioxidant capacities in their respective categories. This suggests that while tropical flowers may generally possess stronger direct free radical scavenging abilities (as indicated by lower IC_{50} values), both tropical and temperate flowers can contain significant amounts of flavonoids and other antioxidant compounds.

These findings underscore the potential of edible flowers, particularly those of tropical origin, as natural sources of antioxidants. The strong antioxidant activities observed, especially in Champaka and Marigold, warrant further investigation into their potential applications in functional foods, nutraceuticals, and natural preservatives. Additionally, the discrepancies observed between DPPH inhibition and total antioxidant capacity highlight the importance of employing multiple assays when evaluating the antioxidant potential of plant extracts.

The present study investigated the total flavonoid content of aqueous extracts from six edible flowers, comprising both tropical and temperate varieties, using the Aluminium trichloride ($AlCl_3$) colorimetric method (Table 3). This method is based on the principle that flavonoid compounds react with $AlCl_3$ to form yellow-colored complexes that absorb light at 415 nm wavelength.[8]

Table 3 Total flavonoid content by edible flower. Data are given as Mean ± SEM (n=3).

Extract	Total flovonoid (µg Quercetin equivalent)
Peach	955.65 ± 55.78
Carnation	1795.50 ± 120.01
Lily	222.05 ± 19.16
Marigold	927.36 ± 151.02
honeysuckle	114.37 ± 9.94
Champaka	224.89 ± 21.08

The results, as presented in Table 3, reveal significant variations in total flavonoid content among the examined floral extracts. Carnation exhibited the highest total flavonoid content of 1795.90 ± 120.01 mg Quercetin equivalent (QE) per gram of extract. This finding aligns with previous studies that have reported high flavonoid content in carnation flowers, particularly quercetin and kaempferol derivatives.[27] The exceptionally high flavonoid content in carnation suggests its potential as a rich source of natural antioxidants.

Peach flowers demonstrated the second-highest flavonoid content (955.65 ± 55.78 mg QE/g extract), followed closely by

Marigold with 927.36 ± 151.02 mg QE/g extract. The high flavonoid content in peach flowers corroborates findings by Zhao *et al*.,[28] who identified various flavonoids, including kaempferol and quercetin glycosides, in peach flower extracts. Marigold's substantial flavonoid content is consistent with its traditional use in herbal medicine and supports previous reports of its antioxidant properties.[23]

Honeysuckle and Lily showed moderate flavonoid contents of 224.89 ± 21.08 and 222.05 ± 19.16 mg QE/g extract, respectively. These results are in line with studies reporting the presence of various flavonoids in Lonicera species, such as luteolin and quercetin derivatives . [17] The flavonoid content in Lily aligns with previous research identifying flavonoids as key bioactive compounds in various *Lilium spps*.[24]

Interestingly, Champaka (*Michelia champaca*) exhibited the lowest total flavonoid content (114.37 ± 9.94 mg QE/g extract) among all samples. This finding contrasts with its potent antioxidant activity observed in the DPPH free radical scavenging assay, suggesting that Champaka's antioxidant properties may be attributed to non-flavonoid compounds. This discrepancy highlights the importance of employing multiple assays when evaluating the antioxidant potential of plant extracts, as suggested by Prior *et al*. [25]

Comparing the tropical (Marigold, Honeysuckle, Champaka) and temperate (Lily, Carnation, Peach) flower groups, it is evident that temperate flowers generally exhibited higher total flavonoid contents. The average flavonoid content for temperate flowers (991.20 mg QE/g extract) was considerably higher than that of tropical flowers (422.21 mg QE/g extract). This trend is particularly interesting given that tropical flowers often demonstrated stronger antioxidant activities in the DPPH assay.

This disparity between flavonoid content and antioxidant activity, especially notable in Champaka, suggests that while flavonoids contribute significantly to antioxidant properties, other non-flavonoid compounds may play crucial roles in the overall antioxidant capacity of these floral extracts. For instance, Champaka has been reported to contain various bioactive compounds, including alkaloids and terpenoids, which may contribute to its antioxidant properties.[22]

The high flavonoid content in temperate flowers, particularly Carnation and Peach, may be attributed to their adaptive responses to environmental stressors such as UV radiation and temperature fluctuations. Flavonoids are known to play protective roles in plants against various environmental stresses.[29]

These findings underscore the potential of edible flowers as natural sources of flavonoids and antioxidants. The high flavonoid content observed, especially in Carnation, Peach, and Marigold, warrants further investigation into their potential applications in functional foods, nutraceuticals, and natural preservatives. Additionally, the discrepancies observed between flavonoid content and antioxidant activity highlight the complex nature of plant-based antioxidants and the importance of comprehensive phytochemical profiling in future studies.

The present study investigated the statistical correlation between antioxidant activity and total flavonoid content of aqueous extracts from six edible flowers. The correlation analysis was performed to elucidate the relationship between antioxidant activity (using vitamin C as a standard) and total flavonoid content (using quercetin as a standard).

Table 4 Correlation Analysis Between Antioxidant Activity and Total Flavonoid Content in Aqueous Extracts of Edible Flowers

Extract	Pearson Correlation Coefficient (r)	P-value	Correlation Strength	Correlation Direction
Peach	-0.311	0.416^{NS}	Weak	Inverse
Carnation	-0.754	0.084^{NS}	Strong	Inverse
Lily	0.429	0.337^{NS}	Moderate	Positive
Marigold	-0.308	0.331^{NS}	Weak	Inverse
honeysuckle	-0.552	0.098^{NS}	Moderate	Inverse
Champaka	-0.483	0.187^{NS}	Moderate	Inverse

NS, *, ** = Non-significant and significant at the 5% and 1% probability levels, respectively.

The results from Table 4 revealed that none of the flower extracts showed statistically significant correlations between antioxidant activity and total flavonoid content, as all P-values exceeded the 0.05 threshold. Specifically, Champaka (p = 0.187), Honeysuckle (p = 0.098), Marigold (p = 0.331), Peach (p = 0.416), Lily (p = 0.337), and Carnation (p = 0.084) all demonstrated non-significant correlations.

However, the strength and direction of these correlations, as indicated by the Pearson correlation coefficient (r), varied among the flower species. Marigold (r = -0.308) and Peach (r = -0.311) exhibited weak inverse correlations, as their r values were below 0.40. This suggests that for these flowers, there is a slight tendency for antioxidant activity to decrease as flavonoid content increases, although this relationship is not strong or statistically significant.

Champaka (r = -0.483), Honeysuckle (r = -0.552), and Lily (r = 0.429) demonstrated moderate inverse correlations, with r values falling between 0.40 and 0.60. Interestingly, while Champaka and Honeysuckle showed negative correlations, Lily exhibited a positive correlation, indicating different relationships between flavonoid content and antioxidant activity among these species.

Carnation (r = -0.754) stood out with a strong inverse correlation, as its r value exceeded 0.60. This suggests that for Carnation, there is a more pronounced tendency for antioxidant activity to decrease as flavonoid content increases, although it's important to note that this relationship was still not statistically significant.

These findings present an intriguing picture of the complex relationship between flavonoid content and antioxidant activity in edible flowers. The lack of significant correlations across all species suggests that flavonoids may not be the sole or primary contributors to the antioxidant activity of these floral extracts. This aligns with previous research indicating that antioxidant activity in plant extracts can be attributed to various compounds beyond flavonoids, including other phenolic compounds, vitamins, and minerals.[30]

The observed inverse correlations, particularly strong in Carnation, are somewhat surprising given that flavonoids are generally associated with antioxidant properties.[31] This unexpected result might be explained by the presence of other bioactive compounds that contribute more significantly to antioxidant

activity in these flowers, or by complex interactions between different phytochemicals that could modulate their individual effects.[32]

Comparing the tropical (Marigold, Honeysuckle, Champaka) and temperate (Lily, Peach, Carnation) flower groups, no clear pattern emerges in terms of correlation strength or direction. This suggests that the relationship between flavonoid content and antioxidant activity may be more species-specific rather than climate-dependent.

These results highlight the importance of considering multiple factors when evaluating the antioxidant potential of plant extracts. While flavonoids undoubtedly contribute to antioxidant activity, their content alone may not be a reliable predictor of overall antioxidant capacity. Future research should focus on comprehensive phytochemical profiling to identify other key antioxidant compounds in these edible flowers and explore potential synergistic or antagonistic interactions among different bioactive components.

In summarized, this study provides valuable insights into the complex relationship between flavonoid content and antioxidant activity in edible flower extracts. The findings underscore the need for a holistic approach in evaluating the antioxidant potential of natural products and highlight the unique phytochemical profiles of different flower species.

CONCLUSION

This study investigated the antioxidant activity and total flavonoid content of aqueous extracts from six edible flowers, encompassing both tropical and temperate varieties. The research employed phytochemical screening, DPPH radical scavenging assay, and flavonoid content determination to provide a comprehensive analysis. All flower extracts contained flavonoids and tannins, with carnation exhibiting the most diverse phytochemical profile. Tropical flowers, particularly Champaka, demonstrated the most potent antioxidant activity. However, temperate flowers generally showed higher total flavonoid contents, with Carnation containing the highest amount. Interestingly, no statistically significant correlations were found between antioxidant activity and total flavonoid content across all flower extracts. This suggests that while flavonoids contribute to antioxidant properties, other non-flavonoid compounds likely play crucial roles in the overall antioxidant capacity of these floral extracts. The discrepancies observed between DPPH inhibition, total antioxidant capacity, and flavonoid content emphasize the importance of using multiple assays when evaluating plant extracts' antioxidant potential. These findings highlight the complex nature of plant-based antioxidants and underscore the need for comprehensive phytochemical profiling in future studies. In conclusion, this study provides valuable insights into the antioxidant properties and flavonoid content of edible flowers, demonstrating their potential as natural sources of bioactive compounds. Future research should focus on isolating specific bioactive compounds, investigating potential synergistic effects, and conducting in vivo studies to elucidate the bioavailability and physiological effects of these floral extracts.

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CONFLICT OF INTEREST STATEMENT

Authors declare no conflict of interest is there for publication of this work.

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