Research Article

Po. Date: Cosmetic Cream

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Abstract: *Both pomegranate peels and date seeds have long been used in traditional medicine and are now gaining recognition in the cosmetic industry for their natural and beneficial properties. By harnessing the antioxidant and bioactive capabilities of these natural ingredients, cosmetic creams can be formulated to provide skincare benefits without the need for harmful preservatives and chemicals. The objective of this study was to assess the antioxidant activity of extracts from pomegranate peels and date seeds, as well as their potential as additives in cosmetic creams. The Soxhlet extraction method was successfully employed to extract the pomegranate peels and date seeds. Phytochemical screening analysis was conducted to determine the phytochemical compositions of the extracted samples, revealing the presence of tannins, phenols, flavonoids, saponins, and alkaloids. The antioxidant activity of the extracts was evaluated using the DPPH radical scavenging assay, which demonstrated their strong antioxidant properties. Based on these results, a cosmetic cream was formulated utilizing these extracts as natural antioxidant ingredients. The cream exhibited desirable qualities, including a yellowish-brown colour, homogeneity without phase separation, absence of unpleasant odour, smooth texture, minimal greasiness, and lack of coarse particles. Furthermore, the cream maintained a pH level suitable for healthy skin. This study underscores the potential of incorporating pomegranate peels and date seeds extracts as natural antioxidant ingredients in cosmetic creams. It offers an attractive option for individuals seeking healthy skincare products derived from entirely natural sources. For future plans, we need to collaborate with researchers from local universities to further enhance the research on this cosmetic cream. Additionally, partnering with industry companies will ensure successful production and distribution of the cosmetic cream.*

Keywords: pomegranate peels; date seeds; cosmetic cream; antioxidant

1. INTRODUCTION

The current problem with many cosmetic creams is the presence of synthetic antioxidants, such as butylated hydroxyanisole (BHA), butylated hydroxytoluene (BHT), and propyl gallate, which have raised concerns regarding their potential health hazards. These synthetic antioxidants have been associated with carcinogenicity, neurotoxicity, cytotoxicity, and allergies (Schmid et al., 2017). As a result, there is a growing demand for cosmetic creams derived from natural sources.

Pomegranate peels and date seeds offer several benefits when incorporated into cosmetic creams. Pomegranate peels and date seeds are rich in phenolic compounds, flavonoids, and proanthocyanidins, which exhibit strong antioxidant activity. These antioxidants help protect the skin against oxidative stress and free radicals, thus reducing the signs of aging and promoting a youthful appearance (Derakhshan et al., 2018). Both pomegranate peels and date seeds possess anti-inflammatory properties. The presence of compounds like ellagic acid and flavonoids in pomegranate peels helps reduce inflammation and soothe irritated skin (Khan et al., 2017). Date seeds contain bioactive compounds such as phenolics, flavonoids, and tannins, which exhibit anti-inflammatory effects and can be beneficial for various skin conditions (Mrabet et al., 2020). Pomegranate peels and date seeds also contribute to the moisturization and hydration of the skin. They contain natural emollients and humectants that help retain moisture, prevent water loss, and improve the skin's overall hydration levels (Haq et al., 2019). Other than that, pomegranate peels are known for their skin brightening and whitening properties. The presence of natural acids, such as ascorbic acid, along with phenolic compounds, helps even out skin tone, reduce hyperpigmentation, and promote a brighter complexion (Naveed et al., 2017).

The scope of this study involved the utilization of Soxhlet extraction to obtain crude extracts from pomegranate peels and date seeds. The study then conducted phytochemical screening to identify the presence of various compounds such as tannins, phenols, flavonoids, saponins, and alkaloids in the extracts. Furthermore, the antioxidant activity of the extracts was evaluated using the DPPH radical scavenging analysis, which demonstrated their high antioxidant capability. Building upon these findings, the study proceeded to formulate a cosmetic cream by incorporating the extracts of pomegranate peels and date seeds. The formulated cream underwent a series of stability tests, including pH identification, organoleptic evaluation, spreadability assessment, centrifugation test, and irritancy test. Notably, the cream was developed as a green cosmeceutical product, devoid of synthetic antioxidants, parabens, Sodium Lauryl Sulfate (SLS), fragrance, and sulfides, which are known to cause skin irritation. Hence, the formulation of this cosmetic cream, enriched with pomegranate peels and date seeds extracts, demonstrates significant potential for commercialization as a potent antioxidant cosmetic cream.

2. METHOD & MATERIAL

The pomegranate peels and date seeds were carefully separated and thoroughly washed to remove any flesh and impurities. Subsequently, they were dried in an oven at 60 °C for 24 hours. Once dried, the pomegranate peels and date seeds were finely ground into a powder using a hammer mill. To extract the desired compounds, 25 g of pomegranate peels and 25 g of powdered date seeds were separately subjected to Soxhlet extraction with methanol as the solvent. The extraction process took place over 6 hours. The resulting extracts were then filtered and evaporated under vacuum conditions using a rotary evaporator at 60 °C. The percentage yield of both extracts was calculated based on the initial amount of starting material.

A preliminary phytochemical screening was conducted using standard methods to detect the presence of tannins, saponins, alkaloids, flavonoids, and phenols in the extracts. To assess the antioxidant activity, 125 μg/ml of a stock solution of each extract in methanol was prepared. Each extract was then mixed with 5 ml of 0.5 mM 2,2-diphenyl-1-picrylhydrazyl (DPPH) at varying concentrations (ranging from 5 to 25 μg/ml). The negative control was prepared using 1 ml of DPPH and 1 ml of methanol without extract and standard. The mixture was then incubated in a dark place at 37 °C for 30 minutes after shaking. Ascorbic acid was used as the standard with a concentration ranging

from 5 to 25 μg/ml. The absorbance of each sample was measured at 517 nm using a UV-Visible spectrophotometer. The percentage inhibition of DPPH was calculated using the formula (1), and the results were expressed as IC_{50} values. The IC_{50} value is the concentration of sample required to scavenge 50% DPPH free radical and was calculated from the graph of radical scavenging activity against the concentration of extract.

$$\text{Percentage inhibition (\%)} = (A_{control} - A_{test})/ A_{control} \times 100 \quad (1)$$

Where; $A_{control}$ is the absorbance of the negative control and A_{test} is the absorbance of the sample/standard

Next, three different formulations of cosmetic creams were successfully prepared by adjusting the ratio of pomegranate peels and date seeds extracts. Firstly, the water phase ingredients, including distilled water and vegetable glycerin, were weighed and placed in a beaker. Simultaneously, the oil phase ingredients, consisting of olive emulsifying wax, shea butter, and jojoba oil, were weighed and placed in another beaker. Both beakers were heated to 75 °C for 20 minutes. The water phase was then slowly incorporated into the oil phase while stirring continuously using a magnetic stirrer until the cream cooled down to 45 °C, resulting in a thicker consistency. Next, the cool-down phase ingredients, comprising the extracts, Germall plus, and niacinamide, were added and thoroughly mixed. Finally, the mixtures were allowed to cool to room temperature before being transferred to jars for further analysis. Each formulation underwent stability tests, including assessments of pH, organoleptic properties, spreadability, centrifugation, and irritancy.

3. FINDINGS

In the present study, the percentage yield of pomegranate peels and date seeds extract was found to be 56.83% and 37.33%, respectively.

3.1 Phytochemical Screening Analysis

The phytochemical screening analysis of pomegranate peels and date seeds extracts was tabulated in Table 1.

Table 1. Phytochemical screening test for methanolic extracts of pomegranate peels and date seeds

No	Phytochemical Parameters	Date Seeds Extract	Pomegranate Peels Extract
1	Tannin	+	+
2	Phenols	+	+
3	Saponin	+	-
4	Flavonoid	+	+
5	Alkaloid	+	+

3.2 Antioxidant Activity

The IC_{50} value of date seeds and pomegranate peels extract was found to be 2.27 μg/mL and 1.66 μg/mL, respectively, compared to ascorbic acid, which had an IC_{50} value of 2.05 μg/mL (Table 2).

Table 2. IC_{50} value of samples and ascorbic acid.

Samples	IC_{50} value (μg/mL)
Pomegranate peels	1.66 μg/mL
Ascorbic acid	2.05 μg/mL
Date seeds	2.27 μg/mL

3.3 Po. Date: Cosmetic Cream

Three suggested formulations of cosmetic creams were successfully prepared, and the stability test for each formulation was effectively analyzed (Table 3).

Table 3. Stability test on Po. Date: Cosmetic Cream

	Cream (F1)	**Cream (F2)**	**Cream (F3)**
Smell	Acceptable	Acceptable	Acceptable
Colour	Yellowish	Light brown	Pale yellow
Texture	Smooth	Smooth	Smooth
Homogeneity	Homogenous	Homogeneous	Homogeneous
Greasiness	Little	Little	Little
Absorption	Within 1-2 min	Within 1-2 min	Within 1-2 min
Coarse particles	Absent	Absent	Absent
pH value	5.08 ± 0.05	5.35 ± 0.03	5.43 ± 0.03
Spreadability	6.50 + 0.57	6.35 + 1.48	7.00 + 0.00

4. DISCUSSION

4.1 Phytochemical Screening Analysis

Phytochemical screening analysis is an essential tool for identifying and utilizing bioactive compounds in the formulation of cosmetic creams. The inclusion of bioactive compounds such as saponins, phenolics, flavonoids, tannins, and alkaloids in cosmetic formulations offers potential benefits for skin health and beauty. Saponins have been recognized for their cleansing, moisturizing, and soothing properties in cosmetic products. They can contribute to gentle and effective cleansing without stripping the skin's natural moisture (Arora & Jaglan, 2017). Phenolic compounds possess antioxidant and anti-inflammatory properties, making them valuable in cosmetic creams for their potential to protect the skin from oxidative stress and soothe inflammation (Faujan et al., 2019). Flavonoids are well-known for their antioxidant, anti-aging, and anti-inflammatory effects. They can contribute to the maintenance of skin health, protection against UV radiation, and reduction of skin redness (Saraf & Kaur, 2015). Tannins possess astringent properties and can contribute to the firming and toning of the skin. They are often used in cosmetic creams to minimize the appearance of pores and provide a smoothing effect (González-Paramás et al., 2019). Alkaloids exhibit diverse pharmacological activities, including antimicrobial and anti-inflammatory effects. In cosmetic creams, alkaloids can contribute to the prevention of skin infections, soothing irritated skin, and overall skin health (Sharma & Ali, 2018).

4.2 Antioxidant Activity

Regarding antioxidant activity, the DPPH free radical scavenging assay is one of the most common methods for screening antioxidant activity due to its short evaluation time. The DPPH free radical is a purple-coloured compound that exhibits a strong absorption maximum at 517 nm. The absorption of the DPPH solution decreases when the odd electron is coupled off in the presence of a free radical scavenger, resulting in a change from deep purple to light yellow colour. Based on the findings, the extracts exhibited a lower IC_{50} value, indicating a higher antioxidant potency and effective inhibition of free radical activity.

4.3 Po. Date: Cosmetic Cream

pH identification is essential to determine whether the formulated cosmetic cream is safe for use on the skin. The physiological pH of human skin ranges from 4 to 6 (Aremu et al., 2020). The present study showed that the pH value for formulation 1 is 5.08, for formulation 2 is 5.35, and for formulation 3 is 5.43 (Sawatdee and Atipairin, 2019). It can be concluded that the three formulated creams can be safely used by consumers.

The organoleptic test is an important stability test that ensures the quality, efficacy, and safety of the prepared cosmetic cream remains unchanged during its shelf life (Setyawaty et al., 2019). The present study showed that each formulation has similar characteristics in terms of smell, homogeneity, greasiness, texture, absorption, and absence of coarse particles. The only difference between these three formulations was the color, which might be due to the different ratios of pomegranate peels and date seed extract used.

Next, the spreadability of the cosmetic cream is represented by the diameter of the spread (Tan et al., 2022). Creams with good spreadability spread over a larger area (Aremu et al., 2020). The results showed that formulation 3, with the same ratio of pomegranate peels and date seeds extracts has the largest spreadability.

Additionally, the centrifugation test was conducted to observe the phase separation of the formulated cream. Phase separation indicates the instability of the cream. In this study, the creams were observed with no phase separation after 10 g of each sample was centrifuged for 30 minutes at 3000 rpm, indicating that the formulated creams are considered stable.

An irritancy test was conducted to assess skin reaction after application. Based on the test, none of the 17 volunteers (14 females, 3 males) showed skin irritation after 6 hours of applying this cream to the skin. It can be concluded that the three formulated creams are unlikely to induce skin irritation under typical use conditions.

The benefits of these creams were demonstrated by the absence of parabens, SLS, sulfides, and fragrance, which frequently cause skin irritation. The findings of this irritation test indicate that green cosmetic creams containing pomegranate peels and date seeds extract, which are skin-friendly, were successfully formulated.

5. CONCLUSION

In conclusion, pomegranate peels and date seeds extracts have shown great potential as antioxidant agents in cosmetic creams. The formulated creams have successfully achieved the goal of creating a green cosmeceutical product and have exhibited positive results that may appeal to consumers. Further characterization and quantitative assays should be conducted to explore the therapeutic and pharmacological activities of pomegranate peels and date seeds extracts as potential sources for additional benefits. Additionally, future studies should focus on evaluating the stability of creams containing pomegranate peels and date seeds extracts using different parameters such as varying times and temperatures, assessing brightening effects, anti-acne properties, and other relevant aspects. Furthermore, it is important to enhance the essential components of pomegranate peels and date seeds extracts to improve their competitiveness. This can be achieved through further research on safe consumption limits and conducting toxicological studies. These efforts will contribute to a better understanding of the potential applications and limitations of these ingredients in cosmetic formulations.

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