Development, Formulation and evaluation of anti aging gel utilizing Allium Cepa Extracts

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Abstract

Objective: This present study introduces a novel herbal formulation for an antiaging gel derived from *Allium cepa* (onion) skin, aiming to provide a natural and effective solution for skin reconstruction. The formulation connects the potent antioxidant and anti-inflammatory properties inherent in *Allium cepa* skin extracts, which have been traditionally recognized for their therapeutic benefits.

Methods: The gel is developed through a meticulous extraction process, preserving the bioactive compounds responsible for combating oxidative stress, reducing fine lines, and promoting collagen synthesis. The formulated herbal antiaging gel contain *Allium cepa* skin extract, a mixture of herbal extracts (aloe vera gel extract, grape seed extract), nourishing oil (jojoba oil, tender coconut oil) gelling agent (carbopol 934) and pharmaceutical chemicals (methylparabene, propyl parabene, propylene glycol ,Vitamin E).

Results: The herbal antiaging gel (F5) which contain different fractions 0.1 g to 2.5g of *Allium cepa* skin and all herbal extract and gelling agent showed maximum antiaging effect. Preformulation studies was on physical parameters like

color, odor, consistency, greasiness, homogeneity and water washability. Pharmaceutical parameters such as pH, spreadability, viscosity and drug content were also evaluated. Antioxidant activities showed that F5 high DPPH scavenging ability 61.54 in ascorbic acid the best formulation was (F5).

Conclusions: Furthermore, the formulation undergoes rigorous safety and stability assessments, ensuring its suitability for topical application. Results from dermatological evaluations, including skin hydration, texture, and wrinkle reduction, provide valuable insights into

the efficacy of the antiaging gel. So, its concluded that *Allium cepa* skin can have a good formulation for antiaging gel.

Introduction

Overview

The word cosmetic comes from the Greek word "Kosmetikos" which means having strength, set skill decorative . Products within the cosmetics category include creams, lotions, fragrances, skin-cleansing products, and ornamental cosmetics. Cosmetic preparations make significant use of components that are naturally occurring (Shanbhag, Nayak, Narayan, & Nayak, 2019). It is typically used to treat a variety of disorders like wrinkles, anti-aging, hyperpigmentation, and hair damage. The cosmetics sector is expanding daily and is being upgraded by emerging technologies like nanotechnology, which presents an opportunity change the cosmetics industry significantly (Wathoni, Haerani, Yuniarsih, & Haryanti, 2018).

Allium cepa (also known as onion) is a perennial herb with the stem in the underground bulb. Onions belong to the *Liliaceae* family, while some authors mention them as *Alliaceae.* Common onion has one or two leafless flower stalks reaching 75–180 cm (2.5–6 feet) in height.

MATERIALS AND METHODS

The research for this thesis was completed at the laboratories of Department of Chemistry, Riphah International University Faisalabad Campus. The process of extraction from the selected parts of *Allium cepa* was carried out at lab of the Department of Chemistry of Riphah International University, Faisalabad Campus.

Method of Formulation of antiaging gel

The following steps were taken: weighed amounts of carbopol 934 were slowly dispersed in 50 milliliters of distilled water in a 250 milliliter beaker; the mixture was then stirred at a high speed with a mechanical stirrer; it was then allowed to swell and stirred some more to form a gel base; 5 milliliters of distilled water and the necessary amount of methyl paraben were dissolved with the help of heat on a water bath; the solution was cooled and propylene glycol was added; additionally, the required amount of *Allium cepa* extract was mixed to the above mixture and volume was made up to 100 milliliters by adding remaining distilled water; all of the ingredients were properly mixed with continuous stirring; triethanolamine was added drop wise to the formulation for the adjustment of skin pH and also to obtain a gel at required consistency (Sarukh, Nagoba, Hindole, Kaudewar, & More, 2019).

The composition and significance of the

various substances used to prepare antiaging gel are displayed in Table 3.1

Evaluation of physical parameters of antiaging gel

It has been imperative to uphold a uniform standard for herbal antiaging gel. Having this in mind, the formulations of herbal antiaging gel were tested for factors including physical parameters and pharmaceutical parameters , pH determination, homogeneity, washability, color, skin irritation, etc.

Color

The color of gel formulations has been checked visually.

Odor

The odor of antiaging gel has been tested by physical method by using sense.

consistency

Consistency of a antiaging gel has been checked by applying on skin (Sarukh et al., 2019).

Greasiness

This test has been assessed by applying gel on skin (Mistry, Mehta, Mendpara, Gamit, & Shah, 2010).

water Wash ability

After applying the formulation to the skin, the length of time that could be spent cleaning it with water was determined.

Homogeneity

Following the gel-setting process within the containers, a thorough assessment of homogeneity was conducted through visual inspection for all developed gels (Sharma, Dwivedi, Mishra, & Joshi, 2012).

Pharmaceutical Parameters

pH Determination

Using a digital pH meter, the pH of several gel formulations was ascertained. After dissolving one gram of gel in 100 milliliters of distilled water, it was kept for two hours. Each formulation's pH was measured three times, and the average results were calculated (Das, Haldar, & Pramanik, 2011).

Spreadability

Spreadability was assessed using a custom-designed apparatus. This apparatus, created in-house, comprises a wooden block featuring a fixed glass slide and a movable glass slide. The movable glass slide is attached to a weight pan, which is rolled on a pulley. The pulley is positioned horizontally alongside the fixed slide for accurate measurements (Bhaskar, Arshia, & Priyadarshini, 2009).

Viscosity

Viscosity of gel was measured by using Brookfield viscometer with spindle (Loftsson & Hreinsdóttir, 2006).

Drug content

To ensure uniformity in the formulation, samples were collected in triplicate and

subjected to drug content analysis. This involved dissolving a precisely measured quantity of gel-cream (1gm) in 100 ml of phosphate buffer (pH 6.8) (Patel et al., 2012).

Extrudability

The force needed for the cream to extrude out of the tube is being measured empirically. A collapsible tube was filled with the prepared gel, sealed, and the tube's weight was noted. The amount of gel that extruded was gathered and weighed when a 500 g weight was placed on the tube. The percentage of gel that was extruded was then calculated. Extrudability measurement has been an essential standard for creams as the packing of creams has become progressively more important in delivering the required quantity of cream (Arun Kumar, Singh, Kaur, & Singh, 2017).

Antioxidant activity

Solution preparations

0.3mM DPPH solution

0.012gm of DPPH was weighed and dissolved in 90 mL of methanol and volume was made up to 100mL.

Standard preparation

Standard preparation 10mg of ascorbic acid was weighed and dissolved in 100ml of distilled water in an amber colored volumetric flask. The solution was vortexed on a cyclomixer and used as standard.

c) Sample preparation

A stock solution was prepared by dissolving 1 gram of the sample in 10 milliliters of methanol. The solution underwent sonication for 10 minutes and was vortexed. The resulting clear methanolic solution was utilized for the assay. Methanol was used for making test samples at various concentrations. Each test sample (2.5 ml) has been mixed with 1 ml of a 0.3 mM DPPH solution. For thirty minutes, these samples were incubated at room temperature in the dark. Absorbance was measured at 516nm using UV- visible spectrophotometer (Jasco V-630) (Souza, Bott, & Oliveira, 2007).

Statistical Analysis

The experimental work was accomplished thrice and the statistical evaluation was carried out using Microsoft Excel. The obtained results expressed as mean ±. SD (Suthar, Singh, & Jain, 2022).

RESULT AND DISCUSSION

Skin imperfections and wrinkles can be reduced with antiaging gel. The benefit is that they are less incurable and may be washed off with a gentle face wash or perspiration. Gel is a semisolid preparation that consists of a liquid phase and a gelling phase that penetrate each other. The molecules can freely diffuse through the skin due to the constant liquid

phase. Because they don't clog pores and have a smaller emollient effects than creams, gels are encouraged. Further, there is increased drug permeation. Skin imperfections and wrinkles are lessened with antiaging lotion. The advantage is that they are less incurable and may be rinsed off with a gentle face wash or moisture. Gel is a semisolid preparation consisting of a liquid phase and a gelling phase that absorb each other. The continuous liquid phase in gels facilitates unhindered molecular diffusion through the skin, making them a preferred choice over creams. Unlike creams, gels offer minimal emollient effects and do not clog pores. This property is advantageous for individuals seeking formulations that promote better absorption without the risk of skin pore blockage. Additionally, gels provide an enhanced ability to penetrate drugs through the skin, making them an ideal choice for delivering therapeutic agents. This characteristic is particularly valuable in pharmaceutical and cosmetic applications, where efficient drug delivery and skin absorption are essential considerations. Overall, the use of gels offers a balance between effective substance delivery and favorable skin compatibility, making them a versatile and preferred option in various topical formulations (Tiwari, 2001).Herbal cosmetic products are formulated using various cosmetic ingredients allowed to form a base from one or more herbal ingredients and provide the desired cosmetic benefits. To improve health and provide patient satisfaction, the usage of herbal cosmetics is suggested as it has fewer side effects compared to synthetic cosmetics (Shivanand, Nilam, & Viral, 2010).

Entry	Ingredients	F-1	F-2	F-3	F-4	F-5	F-6
1	Carbopol 934	1g	1g	1g	1g	1g	1g
2	Methyl Parabene(0.5%)	0.2ml	0.2ml	0.2ml	0.2ml	0.2ml	0.2ml
3	Propylrparabene(0.2%)	0.1ml	0.1ml	0.1ml	0.1ml	0.1ml	0.1ml
4	Propylene glycol	5ml	5ml	5ml	5ml	5ml	5ml
5	Triehthanolamine	1.2ml	1.2ml	1.2ml	1.2ml	1.2ml	1.2ml
6	Tender cocunut oil	10ml	10ml	10ml	10ml	10ml	-
7	Aloe Vera extract	1ml	-	1ml	-	1ml	-
8	Grape seed extract	-	0.2ml	0.2ml	-	0.2ml	-
9	vitamine E	-	-	0.1ml	0.1ml	0.1ml	-
10	jojoba oil	0.05ml	0.05ml	0.05ml	0.05ml	0.05ml	0.05ml
11	*Allium cepa skin*	0.25ml	0.50ml	1ml	1.5ml	2ml	2.5ml

Herbal antiaging gel formulation

In order to produce an antiaging gel from *Allium cepa* skin, the standard process was used. A 250 mL beaker containing a weighed quantity of carbopol

934 was slowly filled with 50 mL of pure water. The mixture was then mixed to create a gel-like substance. With the help of heat on a water bath, 5 mL of distilled water and the necessary amount of methyl parabene were dissolved. After the solution had cooled, propylene glycol was added. Additionally, the preceding combination was combined with the necessary amount of *Allium cepa* extracts, and the remaining distilled water was added to get the volume up to 100 ml. Every component has been thoroughly mixed while constantly being stirred. Triethanolamine was gradually added to formulations to regulate the pH of the skin and also to obtain a gel at required consistency from F-1 to F-6 (Sarukh et al., 2019).

Table 4.1: *Composition of antiaging gel*

Antiaging gel formulations were prepared of six different catagories by adding compositions of ingredients to check out the different parameters with results .F1 contain 0.01 ml of *Allium cepa* skin extract, 0.1 g of carbopol 934 , 0.2 ml of methyl parabeneand 0.1 ml of propylparabn,1.2 ml of triethanolamine, to makeup volume 10mL coconut tender oil, Aloe vera extract,0.05 ml of jojoba oil were added while grapes seed extract and vitmain E were absent in F1 (Table 4.1, F1). While in F2 Aloe Vera extract vitamin E were absent and other formulation was same as F1 (Table 4.1, F2). In F3 all the basic ingredients were used (Table 4.1, F3). F4 formulation didn't have aloe vera extract, grape seed extract, vitamin E were not present (Table 4.1, F4). F5 formulation have same chemistry as F3 so they both have same results as(Table 4.1, F5). F6 didn't have tender coconut oil, Aloe Vera extract, grape seed extract and vitamin E (Table 4.1, F6) (Pandey, Debnath, Gupta, & Chikara, 2011).

4.2 Evaluation of physical parameters of antiaging gel

The herbal antiaging gel's appearance, smell, color, consistency, greasiness, homogeneity, and water washability were evaluated. These formulational physical parameters were calculated by using the method described by (Srivastava & Shah, 2015).

4.2.1 Color

The color of each gel-cream formulation was examined visually. On a white background, they underwent examination each formulation of gel was light yellow color. From formulation F1 to F6 -that are summarized in table

Table 4.2: *Color of Antiaging gel*

Entry	Formulation	Color
1	F1	Light yellow
2	F2	Light yellow
3	F3	Light yellow
4	F4	Light yellow
5	F5	Light yellow
6	F6	Least Light yellow

The color of every formulation from F1 to F6 was found yellow because composition of every fraction was almost same therefore there was no color change in any fraction was observed.

The color of each formulation was observed F1 have yellow color (entry 1,table 4.2). F2 have same color its formulation didn't have aloe vera gel and vitamin E but it didn't effect its color (entry 2,table 4.2). F3 have same color i.e light yellow as F1 formulation (entry 3 ,table 4.2). F4 have light yellow color absence of grape seed extract effect a little bit color appearance but not too much (entry 4, table 4.2). F5 have also same color as it contains all basic ingredients in its formulation (entry 5,table 4.2). F6 is least yellow from all of the above formulations (entry 6 table 4.2) (Mansour et al., 2018).

4.2.2 Odor

The odors of all formulated gel was checked by mixing the gel-cream in water , all the gel have a characteristics like smell all the results are summarized in table 4.3.

Table:4.3: *Odor of Antiaging gel*

Entry	Formulation	Odor
1	F1	sweet odor with onion smell
2	F2	sweet odor with onion smell
3	F3	sweet odor with onion smell
4	F4	sweet odor with onion smell
5	F5	sweet odor with onion smell
6	F6	sweet odor with onion smell

Odor of antiaging gel was tested by smelling it. Each formulation have onion skin about 0.1 g that's why it have a little bit smell of onion too, other ingredients such as methyl parabene, carbopol gel, aloe vera gel, coconut oil, jojoba oil have their own characteristic like odor there after formulation they have sweet odor with onion like smell.

The odor of each formulation was observed F1 have sweet smell (entry 1,table 4.3). F2 have same odor its formulation didn't have aloe vera gel and vitamin E but effect its odor very little bit (entry 2,table 4.3). F3 also have same odor i.e sweet odor as F1 formulation (entry 3 ,table 4.3).F4 have absence of grape seed extract there was a little bit deviation in smell but not too much (entry 4, table 4.3). F5 have also same odor as it contains all basic ingredients in its formulation (entry 5,table 4.3).F6 has

same smell as all of the above formulations (entry 6 table 4.3) (Dash, Murthy, Nath, & Chowdhury, 2010).

Consistency

The consistency was checked by applying on skin. All the formulations were found positive for skin use. All formulations results are tabulated in table

Table 4.4: *Consistency of Antiaging gel*

Entry	Formulation	Consistency
1	F1	Positive
2	F2	Positive
3	F3	Positive
4	F4	Positive
5	F5	Positive
6	F6	Positive

Consistency results showed that all over the formulations were consistent throughout it was easy to apply on the skin. (Pounikar et al., 2012).

Greasiness

The greasiness was assessed by the application on the skin. The greasiness was found negative. The formulations showed that there is no greasiness in all of them (Patel et al., 2012). All the results are designed in table 4.5

Table 4.5*: Greasiness of Antiaging gel*

Entry	Formulation	Greasiness
1	F1	Negative
2	F2	Negative
3	F3	Negative
4	F4	Negative
5	F5	Negative
6	F6	Negative

Homogeneity

All developed gels underwent a homogeneity test through visual inspection, evaluating their appearance and checking for the presence of any aggregates it was homogenized in all of formulation in all fractions from F1 to F6 (Kalita, Tapan, Pal, & Kalita, 2013).

Table 4.6: *Homogeneity of Antiaging gel*

Entry	Formulation	Homogenity
1	F1	Good
2	F2	Good
3	F3	Good
4	F4	Good
5	F5	Good
6	F6	Good

As all the formulations are in liquid state therefore they were found homogenized throughout from (Entry1, table 4.2) to (Entry 6,table 4.2).

Water wash ability

All formulations were applied to the skin, and the ease and extent of washing with water were assessed manually it was easily washable and its wash ability was observe positive (Nayan, Pankaj, Acharya, & Shukla, 2011) and positive results are mentioned in the table 4.7

Table 4.7: *Water washability of Antiaging gel*

Entry	Formulation	Water washability
1	F1	Washable
2	F2	Washable
3	F3	Washable
4	F4	Washable
5	F5	Washable
6	F6	Washable

For the formulation of different fractions of antiaging gel from *Allium cepa* skin for test of water washability was applied on the skin then washed all the formulation were easily washable (Salavkar, Tamanekar, & Athawale, 2011).

Pharmaceutical Parameters

pH determination

The pH of the prepared gel-cream was measured using a digital pH meter. A 1% solution of the formulation was prepared with distilled water. The pH of each formulation was determined in triplicate, and average values were calculated that values are placed in the table (Yamini & Onesimus, 2013).

Table 4.8: *pH determination of Antiaging gel*

Entry	Formulation	pH
1	F1	6.38 ±0.0057
2	F2	6.41 ±0.0058
3	F3	6.38 ±0.0059
4	F4	6.35 ±0.0060
5	F5	6.28 ±0.0061
6	F6	6.21 ±0.0062

The mean±SD is used to express the values. SD stands for standard deviation.

It has been previously noted that the pH of gels must lie within the physiological acceptable range for topical therapies, i.e., pH 6–7 units, in order for them to be non-irritating and safe for topical administration. According to Table 3, the pH range of several antiaging cream formulations was between 6.2 and 6.4, which is within the normal physiological range and doesn't cause skin irritation.

The pH of each formulation was evaluated F1 have pH 6.34(entry 1,table 4.8). F2 have slightly deviation in pH i.e 6.4 as its formulation didn't have aloe vera gel and vitamin E (entry 2 , table 4.8). F3 have same pH as F1 formulation because they both have same composition (entry 3 ,table 4.4).F4 have pH range 6.35 which is approximately same as to F1 (entry 4, table 4.8). F5 have a very suitable pH range as it contains all basic ingredients in its formulation (entry 5,table 4.8).F6 is least acidic from all of the above formulations in the range of 6.21 which is very non irritating for the skin (entry 6 table 4.8) (Hughes, Alipaz, Drnevich, & Reynolds, 2002).

Spreadability

Spreadability was evaluated using a

custom-built apparatus, comprising a wooden block with a fixed glass slide and a movable glass slide. The movable slide was attached to a weight pan, rolling on a horizontally aligned pulley with the fixed slide. The 'Slip and Drag' characteristics determined the spreadability of the formulated gel. Approximately 2 grams of the gel were placed on the ground slide for evaluation. After sandwiching the gel between the slides, a one-kilogram weight was applied on the top for 5 minutes to ensure a uniform gel film. Excess gel was removed, and the top plate was subjected to a 50-gram pull-off force. The time (T, in seconds) for the top slide to move 7.5 cm was recorded, with a shorter interval indicating better spreadability (Yamini & Onesimus, 2013). Results are in table 4.9.

Table 4.9: *Spreadability determination of Antiaging gel*

Entry	Formulation	Spreadability (g.cm/sec) ± S.D. (n=3)
1	F1	31.15±0.05
2	F2	32.12±0.16
3	F3	31.23±0.29
4	F4	32.4±0.60
5	F5	33.4.±0.61
6	F6	23.75±0.62

The values are expressed as mean±SD. SD: Standard deviation.

The spreadability is an important criteria for uniform and ease of application of topical preparations. From a point of view of patient compliance, it is also very important. Application of the formulation to the skin is more comfortable if the base spreads easily, exhibiting maximum "slip" and "drag." The average spread circle diameter is used to quantify the spreadability of creams and gels.

The spreadability of each formulation was evaluated from F1 to F6. F1 have spreadability rang 31.15 (entry 1,table 4.9). F2 have slightly deviation in spreadability i.e 32.12 as its formulation didn't have aloe vera gel and vitamin E (entry 2 , table 4.9). F3 have spreadability as F1 formulation because they both have same composition (entry 3 ,table 4.9).F4 have spreadability 32.4 g per cm per second which is approximately same as to F1 (entry 4, table 4.9). F5 have spreadability 23.75 range as it contains all basic ingredients in its formulation (entry 5,table 4.9).F6 have spreadabilty 23.75 from all of the above formulations and it is easy to spread on the skin than other formulations because all the basic ingredients are present in this formulation (entry 6 table 4.4) (Miladi & Damak, 2008).

Viscosity

The viscosity of the gel-cream

formulations was assessed employing a Brookfield digital viscometer (RVT) with a rotating spindle (62) set at 0.5 rpm. Prior to measurements, the gel-cream samples were allowed to settle for 30 minutes at a specified temperature of 25 ± 1°C. The viscosity readings were reported in centipoises (cps) (Yamini & Onesimus, 2013).

Table 4.10: *Viscosity of Antiaging gel*

Entry	Formulation	viscosity
1	F1	2493.76±5.37
2	F2	2465.47±0.58
3	F3	2566.45±0.59
4	F4	2434.45±0.60
5	F5	2667.45±0.61
6	F6	2322.55±0.62

The values are expressed as mean±SD. SD: Standard deviation.

Viscosity is an important factor in determining the gel formulation's flow resistance and enables appropriate absorption by the skin.

The viscosity of formulations were calculated by using viscometer . F1 have viscosity 2493.76 ± 5.37 (entry 1, table 4.4). F2 have slightly different viscosity i.e 2465.47 as its formulation didn't have aloe vera gel and vitamin E (entry 2 , table 4.4). F3 formulation contain viscosity about 2566.45 because it have all the viscous basic materials in liquid state (entry 3 ,table 4.4). F4 have viscosity 2434.45 ± 0.60 as it didn't have aloe vera gel and grapes seed extract there its viscosity is slightly different (entry 4, table 4.4). F5 have viscosity 2667.45 ± 0.61 as it contains all basic ingredients in its formulation (entry 5,table 4.4). F6 is least viscous from all of the above formulations in the range 2322.55 ± 0.62 which is thick all than other (entry 6 table 4.4)(Rana, Prakash, & Sagar, 2016).

Drug content

To maintain uniformity in the formulation, three replicate samples were collected and analyzed for drug content. This involved dissolving precisely weighed quantities of gel-cream (1 gram) in 100 mL of phosphate buffer (pH 6.8). The solutions were then quantitatively transferred to volumetric flasks, with subsequent dilutions as necessary. After filtration, the resulting solutions underwent spectrophotometric analysis at 260 nm (Vats & Sharma, 2012).

Table 4.11: *Drug content of Antiaging gel*

Entry	Formulation	Drug content %± S.D. (n=3)
1	F1	98.26±0.16
2	F2	98.21±0.16
3	F3	98.23±0.28
4	F4	98.27±0.15
5	F5	98.33±0.57
6	F6	98.13±0.12

Formulation F1 have 98.26 drug content as its formulations didn't have grapes seed extract and vitamin E (Entry 1 table 4.11) , F2 has minor less drug contents percentage 98.21 as its formulation didn't have Aloe Vera extract and vitamin E (Entry 2 table 4.11).F3 have 98.23 % of drug content(Entry 4 table 4.11) .F5 have highest drug content as *Allium cepa* skin is in high quantity in this fraction (Entry 5 table 4.11) .F6 has least drug content because of the absence of the oils and extracts (Entry 6 table 4.11).

Table 4.13: *DPPH assay of antiaging gel and standard ascorbic acid*

Entry	Concentration mg/mL	Formulation	DPPH assay
1	0.25	F1	44.24±1.03
2	0.5	F2	32.57±1.03
3	1	F3	36.32±0.9
4	1.5	F4	40.83±1.5
5	2	F5	61.54±2.02
6	2.5	F6	40.33±0.94

Extrudability

The method used in this investigation to determine the extrudability of the gel formulation was based on the percentage of gel and the amount of gel that was extruded from a lacquered aluminium collapsible tube after applying the weight in grams needed to extrude a minimum of 0.5 cm of gel ribbon in 10 seconds. Extrudability improved with greater extrusion quantity (Lakshmi, Kumar, Sridharan, & Bhaskaran, 2011). Calculated results are in table 4.12.

Table 4.12: *Extrudability of Antiaging gel*

Entry	Formulation	Extrudability
1	F1	90.7±0.6
2	F2	90.5±0.9
3	F3	92.6±1.13
4	F4	92.5±0.08
5	F5	93.7±0.10
6	F6	92.7±0.11

Formulation F1 have 90.7 extrudability as its formulations didn't have grapes seed extract and vitamin E (Entry 1 table 4.12) , F2 has minor less extrudability percentage 90.5 as its formulation didn't have Aloe Vera extract and vitamin E (Entry 2 table 4.12).F3 have 92.6 % of extrudability (Entry 4 table 4.12) . F5 have highest extrudability as *Allium cepa* skin is in high quantity in this fraction (Entry 5 table 4.12)

has 92.7 extrudability because of the absence of the oils and extracts (Entry 6 table 4.12).

Antioxidant activity of antiaging gel

DPPH free radical scavenging activity

The results outlining the antioxidant activity at different concentrations of both the samples and the standard (ascorbic acid) are summarized in

the table. The samples exhibited significant antioxidant activity by efficiently scavenging DPPH* (free radicals) and converting them into DPPHH. A noticeable dose-dependent pattern in radical scavenging activity was observed, with ascorbic acid demonstrating higher scavenging activity than all nine cream samples. Particularly, the F2 sample displayed the highest antioxidant activity. When an antioxidant is present, the DPPH radical gains an extra electron, leading to a decrease in absorbance. In this study, the scavenging activity of the F2 sample showed a dose-dependent relationship, indicating that higher concentrations corresponded to increased scavenging activity. Although the DPPH radical scavenging abilities of the samples were lower than that of ascorbic acid, the study highlighted that the samples possess proton-donating abilities. They could potentially act as free radical inhibitors or scavengers, functioning as primary antioxidants (Waqas et al., 2010). Results are in table 4.13

Formulation F1 have 44.24 DPPH scavenging as its formulations didn't have grapes seed extract and vitamin E (Entry 1 table 4.13) , F2 has least DPPH scavenging percentage 32.57 as its formulation didn't have Aloe Vera extract and vitamin E (Entry 2 table 4.13). F3 have 36.32 DPPH scavenging (Entry 4 table 4.13) . F5 have highest DPPH scavenging as *Allium cepa* skin is in high quantity in this fraction (Entry 5 table 4.13) . F6 has 40.33 DPPH scavenging because of the absence of the oils and extracts (Entry 6 table 4.13).

Conclusion

Furthermore, the formulation undergoes rigorous safety and stability assessments, ensuring its suitability for topical application. Results from dermatological evaluations, including skin hydration, texture, and wrinkle reduction, provide valuable insights into the efficacy of the antiaging gel. So, its concluded that *Allium cepa* skin can have a good formulation for antiaging gel.

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