JOURNAL OF SCIENTIFIC RESEARCH IN ALLIED SCIENCES
ISSN NO. 2455-5800
Contents available at www.jusres.com

Design and In vitro Assessment of Formulated Antioxidants

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ARTICLE INFO **ABSTRACT** **ORIGINAL RESEARCH ARTICLE**

Article History
Received: May 2026
Accepted: June 2026

Keywords: Free Radicals, Oxidation, Antioxidants

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Free radicals attack important macromolecules leading to cell damage and homeostatic disruption. Targets of free radicals include all kinds of molecules in the body. Among them, lipids, nucleic acids, and proteins are the major targets. Antioxidants or inhibitors of oxidation are compounds which retard or prevent the oxidation and in general prolong the life of the oxidizable matter. Many of Research have shown that antioxidants are widely used in dietary supplements and have been investigated for the prevention of diseases. Thus, it was planned to assess the formulated antioxidants.

INTRODUCTION

Epidemiological research confirms that the conditions connected to oxidative stress can be improved by the consumption of food products rich in numerous compounds with high antioxidant activity. Natural products containing of antioxidants can be accepted as dietary supplements with antioxidant properties. It should be emphasized that antioxidant capacity reflects the thermodynamic conversion efficiency of reactive species by antioxidants in contrast to the antioxidant activity, which is related to the kinetics of this reaction, usually expressed scavenging percentages per unit time. A free radical can be defined as any molecular species capable of independent existence that contains an unpaired electron in an atomic orbital. The presence of an unpaired electron results in certain common properties that are shared by most radicals. Many radicals are unstable and highly reactive. They can either donate an electron to or accept an electron from other molecules, therefore behaving as oxidants or reductants. [1] The most important oxygen-containing free radicals in many disease states are hydroxyl radical, superoxide anion radical, hydrogen peroxide, oxygen singlet, hypochlorite, nitric oxide radical, and peroxynitrite radical. [2] These are highly reactive species, capable in the nucleus, and in the membranes of cells of damaging biologically relevant molecules such as DNA, proteins, carbohydrates, and lipids. Free radicals attack important macromolecules leading to cell damage and homeostatic disruption. Targets of free radicals include all kinds of molecules in the body. Among them, lipids, nucleic acids, and proteins are the major targets. Antioxidants or inhibitors of oxidation are compounds which retard or prevent the oxidation and in general prolong the life of the oxidizable matter. [3-4] Many of Research have shown that antioxidants are widely used in dietary supplements and have been investigated for the prevention of diseases. Thus, it was planned to assess the formulated antioxidants.

EXPERIMENTAL WORK

Collection of Drug and Excipients

The apigenin extract powder was collected as a gift sample. All the other excipients material like lemon oil, coconut oil was purchased from the local market of Bhopal.

Formulation of antioxidant preparation

The emulsion (o/w) was prepared according to the formula given below in table 1. The oil components consisting of lemon oil, coconut oil and tween 20 is mixed together for 10 minutes to obtain a uniform solution. At the same time the water phase was prepared by mixing glycerine and small amount of distilled water uniformly. The oil phase is added to the liquid phase by drop wise under by trituration method using mortal pestle to obtained oil in water based on biphasic emulsion like preparation. [5-6]

Table 1 Composition of antioxidant preparation

Ingredients	F1	F2
Apigenin Powder	80%	70%
Lemon oil	2.5%	5%
Coconut oil	5.%	2.5.%
Glycerin	10%	20%
Tween 20	2.0%	2.0%
Perfume	Q.S	Q.S

Determination of antioxidant activity of formulated antioxidant preparation by DPPH radical scavenging activity

The DPPH assay was performed by the method described by Mohammad et al. In brief, 4.0 mg of DPPH (1, 1–Diphenyl–2–picrylhydrazyl) was dissolved in 3.0 ml of methanol, it was protected from light by covering the test tubes with aluminium foil. 150µl DPPH Solution was added to 3 ml of methanol, and absorbance was taken immediately at 517 nm for the control reading. 50µl of various concentrations of formulated preparation and standard compound (Ascorbic acid) were taken, and the volume was adjusted to 150µl using methanol. Each sample was diluted with methanol up to 3 ml, and 150µl DPPH was added. Absorbance was taken after 15 min. At 517 nm using methanol as a blank on a UV-visible spectrometer. The IC_{50} values formulated preparation and standard preparations were calculated. [7]

RESULTS AND DISCUSSION

Evaluation of formulated of antioxidant preparation

Physical Evaluation

The formulated herbal serum preparation was evaluated in terms of colour, odour, taste and texture. The findings were reported in table 2

Table 2 Physical evaluation of formulated antioxidant preparation

S.N.	Parameter	F1	F2
1	Colour	Light Brown	Brown
2	Odour	Characteristic	Characteristic
3	Taste	Tasteless	Tasteless
4	Texture	Smooth homogenous	Smooth homogenous

pH Value and Spreadability

The pH of formulation was found to be 6.3. As the skin having an acidic pH around 4.5-6.7, this range of formulation is suitable for skin. The spread ability of liquid formulation is capacity of the antioxidant preparation to spread over the skin. The findings were reported in table 3

Table 3 Findings of pH and spreadability value of formulated antioxidant preparation

S.N.	Formulation Code	pH	Spreadability
1	F1	5.3	94%
2	F2	5.2	93%

Stability studies

The formulation was undertaken stability studies for physical and chemical changes. No considerable variations in properties of the formulation were observed. The findings were reported in table 3

Table 3 Stability studies of formulated antioxidant preparation

S.N.	Parameter	F1	F2
1	Visual Appearance	Light brownish	Brownish
2	Phase Separation	NIL	NIL
3	Homogeneity	Good	Good

Determination of antioxidant activity of formulated antioxidant preparation by DPPH radical scavenging activity

The DPPH assay was performed by the method described as standard method. The IC_{50} values formulated preparation and standard preparations were calculated. The findings were reported in table 4

Table 4 Determination of antioxidant activity of formulated antioxidant preparation

S.N.	Sample	Concentration	% Reducing	IC_{50} values (µg/ml)
1	F1	10	14.25	16.50
		20	29.30	
		30	49.25	
		40	64.35	
		50	87.40	
2	F2	10	12.30	12.60
		20	27.20	
		30	47.25	
		40	63.20	
		50	88.20	
3	Ascorbic Acid	10	16.30	18.10
		20	33.25	
		30	57.20	
		40	78.40	
		50	98.20	

CONCLUSION

By targeting oxidative stress-mediated mechanisms underlying chronic diseases, medicinal plant antioxidants offer promising avenues for preventive healthcare and integrative medicine approaches. Further scientific validation

through clinical studies and standardized extraction methods is essential to fully harness the potential of these natural compounds for pharmaceutical and nutraceutical applications. Continued research in this field may lead to the development of safer, more effective, and accessible antioxidant therapies derived from medicinal plants.

REFERENCES

1. Kala CP, Dhyani PP, Sajwan BS. Developing the medicinal plants sector in northern India: challenges and opportunities. Journal of Ethnobiology and Ethnomedicine. 2006; 2:32.
2. Mohan SC, Balamurugan V, Salini ST, Rekha R. Metal ion chelating activity and hydrogen peroxide scavenging activity of medicinal plant Kalanchoe pinnata. Journal of Chemical and Pharmaceutical Research. 2012; 4(1): 197-202.
3. TK Gopal, Harish G, D Chamundeeswari, C Umamaheswara Reddy. *In-vitro* Anti-Oxidant Activity of Roots of Boerhaavia diffusa Linn, Research journal of Pharmaceutical, Biological and Chemical Sciences. 2010; 4, 782- 788.
4. Souri E, Amin G, Farsam H, Jalalizadeh H, Barezi S. Screening of thirteen medicinal plant extracts for antioxidant activity. Iranian Journal of Pharmaceutical Research. 2008; 7(2): 149-154.
5. Tiwari AK. Antioxidants: New generation therapeutic base for treatment of polygenic disorders. Current Science. 2004; 86 (8):1092-1102.
6. Nithiya P, Mohan K. Antioxidant effect of *Trichosanthes tricuspidata* root extract on sildenafil induced migraine in albino mice, Pharmacognosy Research. 2009; 1: 402-405.
7. Pandey Neha, Barve Dushyant. Antioxidant activity of ethanolic extract of Annona squamosa Linn Bark, International Journal of Research in Pharmaceutical and Biomedical Sciences. 2011; 2(4), 1629- 1697.