

Review of Pegagan (*Centella asiatica*) as Antioxidant in Pharmaceutical Preparations

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ABSTRACT: The effects of free radicals can be fought off by antioxidants. The utilization of natural substances as a source of antioxidants in a pharmaceutical formulation has recently been established. The herb pegagan is one of the Indonesian herbs that can be utilized for this. Various preparations containing antioxidants from pegagan have been widely available on the market. In this journal review, we will discuss pharmaceutical preparations that function as antioxidants derived from pegagan.

KEYWORDS: Antioxidant, Preparations, Pegagan.

I. INTRODUCTION

(1) Oxidative stress is the result of an imbalance between the body's production of endogenous antioxidants such as superoxide dismutase (SOD), glutathione peroxidase (GPx), and catalase (CAT) and the number of free radicals. This circumstance may result in cell damage that leads to the development of diseases like cancer, heart disease, cataracts, early aging, and other degenerative conditions. Free radicals can enter the body as byproducts of the oxidation process and cell burning that occur during breathing, cell metabolism, excessive or vigorous exercise or physical activity, inflammation, and exposure to pollution from the environment, such as cigarette smoke, heavy metals in food, industrial pollution, and solar radiation. Exogenous sources and endogenous sources are the two types of sources for free radicals. Exogenous sources, such as air pollution, radiation, carcinogenic substances, cigarette smoke, bacteria, viruses, and medicine side effects, typically originate from outside the body (anesthesia drugs and pesticides). Endogenous sources of free radicals include food oxidation,

xanthine oxidation, and strenuous exercise. Free radicals are normal metabolic byproducts in the human body.

(2) There are various methods to determine for antioxidants, such as the free radical reduction techniques DPPH, ABTS, and FRAP. The DPPH method relies on the presence of hydrogen atoms from antioxidant chemicals that attach to free electrons in radical molecules and transform them into non-radical compounds (diphenylpicrylhydrazyl)

(diphenylpicrylhydrazine). It is distinguished by a purple to yellow color shift (free radical compounds are reduced by the presence of antioxidants). In order to determine the antioxidant capacity that directly reacts with the ABTS cation radical, the ABTS method's basic tenet is to eliminate the color of the ABTS cation. Antioxidants can convert the ABTS radical, which has a nitrogen core and a distinctive blue-green color, into a non-radical form, which is colorless. The ABTS technique is extremely light-sensitive; even the synthesis of ABTS necessitates an incubation period of 12 to 16 hours in dark conditions. The FRAP method selectively, in theory, be used to determine the antioxidant activity of substances that can decrease ferri-tripyridyl-triazine (Fe(III)TPTZ) to ferro-tripyridyl-triazine (Fe(II)TPTZ) complex.

Antioxidants are naturally derived from fruits, vegetables, nuts, and herbal plants. As shown in table 1 below, there are numerous sources of natural antioxidants.

Table 1. Antioxidants from natural ingredients

Natural ingredient	Antioxidant activity	Method	Ref
Papaya seeds	462,7 ppm	DPPH	(3)
Bingkek seeds	77,60 ppm	DPPH	(4)
Duwet seeds	49-52%	FRAP	(5)
Date seeds	5,74 ppm	DPPH	(6)
Red fruits	14.54 ppm	DPPH	(1)
Dragon fruits	1.08%	DPPH	(7)
Walnut kernels	10106,75 ppm	DPPH	(8)

Antioxidants have been widely used for pharmaceutical applications. Various pharmaceutical preparations with antioxidant activity have been sold commercially. The table 2

below summarizes several studies that investigate at pharmaceutical formulations with antioxidant capabilities derived from natural components.

Table 2. Antioxidant preparations with the natural active compound

Natural ingredients	Preparation	Ref
Chickpea Extract	Gel	(9)
Pineapple peel extract	Hand body lotion	(10)
Mangosteen rind	Antiaging cream	(11)
Papaya fruit methanol extract	Cream	(12)
Cacao fruit skin	Lotion	(13)
Pineapple peel extract	Scrub	(10)
Pumpkin	Body scrub	(14)
Ceremai Fruit Extract and Watermelon Peel	Serum	(15)
Catechins gambier and lime	Sugar body scrub	(16)

(9)Antioxidant gel preparation containing chickpea fruit extract is relatively stable and safe to use.Ethanol extract of chickpea (*Phaseolus vulgaris* L.) has antioxidant activity with IC50 value of 0.1116%.(10) In the formula with an extract concentration of 1.5%, the IC50 value is 105.98 g/mL. Ethanol extract from mangosteen rind has an IC50 value of 18.23 g/mL at room temperature.(12)The biggest percent reduction is shown with Formula F5, which has an IC50 of 99.8599 ppm and a concentration of 4.03 percent. (13)Formula containing 0.1728% ethanol extract of Cacao fruit peel provides the best activity. In the formula containing 1.5% extract, the IC50 was 47.95 ± 0.88 g/mL.(14)The preparation with 20% pumpkin juice concentration (F3) has the closest effectiveness to positive control, which is able to improve skin smoothness (evenness) up to 50.00% and increase moisture content (moisture) up to

46.33%. The conclusion of this research is pumpkin juice (*Cucurbita moschata*) can be formulated in the form of a body scrub cream that is stable and able to improve rough skin conditions for the better.(15)Serum antioxidant activity with the best activity has an IC50 value of 326.71 ppm. (16)The formula that has the highest antioxidant activity is the formula with 3% gambier catechin concentration has an IC50 value of 14.87 g/ml.

Antioxidant preparations made from natural components are nevertheless a common ingredient at the moment.Pegagan (*Centella asiatica*), which has numerous advantages including antioxidant activity, will be no exception.As indicated in table 3 below, there are several different kinds of antioxidant preparations made from Pegagan.

Table 3. Antioxidant preparations from Pegagan

Ref	Preparation	
(17)	Hand And Body Lotion	With an IC ₅₀ value of 449.14 ppm, the optimal formulation contains pegagan extract at a maximum concentration of 5%.
(18)	Lotion	The IC ₅₀ value of Pegagan leaf powder is 294.71 ppm
(19)	Gel mask	According to the study's findings, a gel mask made from ethanol-extracted Pegagan and niacinamide with carbomer variations of 1% and 1.5% generates good physical quality as measured by organoleptic tests, homogeneity, pH, dispersibility, and syneresis tests, and is stable for four weeks of storage.
(20)	Serum	.The serum Pegagan extract Formula 1, 2, and 3 each had an IC ₅₀ of 110 g/mL, 111.94 g/mL, and 113.24 g/mL, according to the results of the antioxidant activity tests. The IC ₅₀ value's findings fall within the heading of moderate antioxidant activity.
(21)	Gel peel off	The gel peel off mask formula combination of Pegagan extract and niacinamide with a concentration of 5% gotu kola extract gave the best IC ₅₀ value of 119.74.
(22)	Ready to serve drink	Drinks with the best antioxidant and flavonoid capacity were drinks with a combination of 3.0% cem-cem leaf extract, 0.5% Pegagan leaf and 0.5% katuk leaf with an IC value of 50 238.69 ppm.
(23)	Efferfescent instant drink	The results of the evaluation of the antioxidant activity of the product with the addition of 55% efferfescent was 24.97%

(17)Pegagan was extracted by soxhletation method using 96% ethanol as a solvent and formulated in the form of hand and body lotion using various concentrations of pegagan extract, respectively 1%, 3% and 5%.(18) The Pegagan herb extract was carried out by maceration, the lotion formula was made with a 5% concentration of pegagan herb extract.The resulting preparations were tested for quality, stability for 8 weeks at room temperature (25-30°C).(19)The maceration procedure is used to create the thick extracts of the gotu kola herb.(20) This study combines HPMC with chitosan which both have the properties of influencing the antioxidant properties of serum preparations and measuring antioxidant activity.Facial serum made in three different concentrations of HPMC as a

gelling agent, namely 4%, 6%, and 8% with an IC₅₀ value, respectively. This study was conducted to determine the effect of variations in the levels of pegagan extract on the antioxidant activity of the peel-off gel mask preparation pegagan combined with niacinamide.(22)This research is to get the right combination of cem-cem leaf extract, katuk leaf and pegagan leaf to produce a ready-to-serve drink with functional value with higher antioxidant potential than its constituent components.(23)Antioxidant activity is significantly affected by the treatment of adding an effervescent mixture to the effervescent powder of gotu kola leaves.

REFERENCES

- [1]. Sangkala S, Jura MR, Tangkas IM. Uji Aktivitas Antioksidan Ekstrak Buah Merah (Pandanus Baccari L) di Daerah Poso Sulawesi Tengah. *J Akad Kim.* 2014;3(4):198–205.
- [2]. Setiawan F, Yunita O, Kurniawan A. Uji aktivitas antioksidan ekstrak etanol kayu secang dan FRAP. *Media Pharm Indones.* 2018;2(2):82–9.
- [3]. Sambiri RDH, Ardana M, Rusli R. Aktivitas Antioksidan Ekstrak Biji Pepaya (Carica papaya L.) yang Diekstraksi dengan Metode Refluks. *Proceeding Mulawarman Pharm Conf.* 2016;3(January):364–6.
- [4]. Mubarrak J, Teruna HY, Ade FY, Khairina E. BIOAKTIVITAS ANTIOKSIDAN BIJI TUMBUHAN BINGKEK *Entada phaseoloides merr*). 2015;4(2):129–34.
- [5]. Rohadi R, Rahadjo S, Izul Falah L, Santoso U. AKTIVITAS ANTIOKSIDAN EKSTRAK BIJI DUWET (*Syzygium cumini* Linn.) PADA PEROKSIDASI LIPIDA SECARA IN VITRO. *J Agritech.* 2016;36(01):30.
- [6]. Warnasih S, Widiastuti D, Hasanah U, Ambarsari L, Sugita P. Aktivitas Antioksidan Dan Flavonoid Ekstrak Biji Kurma. *Ekologia.* 2020;19(1):34–8.
- [7]. Britt H, Umayah E, Moch U, Pengajar S, Studi P, Universitas F. Uji Aktivitas Antioksidan Ekstrak Buah Naga (*Hylocereus undatus* (Haw.)) (Antioxidant Activity Assay of Dragon Fruit Extract (*Hylocereus undatus*). 2007;8(1):83–90.
- [8]. Joe suryadi ns. Daya antioksidan ekstrak etanol biji kenari (*J Ilm Mhs.* 2013;2(2):1–9.
- [9]. Sihombing CN, Wathoni N, Rusdiana T. Formulasi Gel Antioksidan Ekstrak Buah Buncis (*Phaseolus vulgaris* L.) dengan Menggunakan Basis Aqupec 505 HV. *Pharmaciana.* 2007;6(2):21–33.
- [10]. Rahmatullah S, Permadi YW, Utami DS. Formulasi dan Uji Aktivitas Antioksidan Sediaan Hand and Body Lotion Ekstrak Kulit Nanas (*Ananas comosus* (L.) Merr) dengan Metode DPPH. *J Farm FIK UINAM.* 2019;7(1):26–33.
- [11]. Harun DSN. Formulasi dan Uji Aktivitas Antioksidan Krim Anti- Aging Ekstrak Etanol 50% Kulit Buah Manggis (*Garcinia magostana* L.) dengan Metode DPPH (1,1 - Diphenyl-2- Picril Hydrazil). 2014. 16 p.
- [12]. Mayawati E, Pratiwi L, Wijianto B. (Carica papaya L .) Dalam Formulasi Krim Terhadap DPPH (2 , 2-diphenyl-1-picrylhydrazil) Bagian Teknologi Farmasi , Fakultas Kedokteran , Universitas Tanjungpura Bagian Kimia Farmasi , Fakultas Kedokteran , Universitas Tanjungpura ANTIOXIDANT EFFECT O. *J Mhs Farm Univ Tanjungpura.* 2014;1(1):5–8.
- [13]. Faramayuda F, Alatas F, Rayani TT. FORMULA SEDIAAN LOSION ANTIOKSIDAN EKSTRAK ETANOL KULIAH BUAH COKLAT (*Theobroma cacao* L.). Vol. 1, Kartika Jurnal Ilmiah Farmasi. 2013.
- [14]. Farmasetika M, Penelitian A. Formulasi dan Uji Efektivitas Sediaan. 2021;6(4):375–85.
- [15]. Ernawati EE, Farida Y, Taurhesia S. Formulasi Serum Antioksidan Kombinasi Ekstrak Buah Ceremai dan Kulit Buah Semangka. *Maj Farmasetika.* 2021;6(5):398.
- [16]. Andriyanti, Indriati W. Uji antioksidan sediaan. 2018;1–5.
- [17]. Riwanti P, Izazih F, Amaliyah. *Journal of Pharmaceutical Care Anwar Medika.* Pengaruh perbedaan konsentrasi etanol dan kadar flavonoid Total ekstrak etanol 50, 70, dan 96 % *Saragassum polycystum* dari Madura. 2020;2(2):35–48.
- [18]. Sumiati T, Effendy F, Riani E. FORMULASI LOSION EKSTRAK HERBA PEGAGAN (*Centella Asiatica* (L.) Urban) DAN Uji MUTU SERTA STABILITASNYA. *J Farmamedika (Pharmamedica Journal).* 2019;4(2):62–9.
- [19]. Juliadi D, Juanita RA. FORMULASI DAN Uji MUTU FISIK MASKER GEL KOMBINASI EKSTRAK ETANOL HERBA PEGAGAN (*Centella asiatica* (L.) Urb.) DAN NIASINAMIDA DENGAN VARIASI KARBOMER. *J Farmagazine.* 2022;9(1):71.
- [20]. Aziza AN, Harapan P, Tegal B. Pengaruh Konsentrasi HPMC-Kitosan Terhadap Sifat Fisik dan Aktivitas Antioksidan Serum Ekstrak Pegagan (*Centella asiatica* L . Urban) The Effect of HPMC-Chitosan Concentration on Physical and Antioxidant Properties of Serum Pegagan Extract (*Centella asi.* 2022;9(1):9–19.
- [21]. Nurhayati D, Penggunaan S, Pada C, Iskemik PS. Program studi farmasi fakultas ilmu kesehatan universitas muhammadiyah malang 2021. 2021;



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- [22]. IDPK Pratiwi, AA Sri Wiadnyai. Aktivitas Antioksidan Dan Kandungan Flavonoid Minuman Ready To Serve Dari Ekstrak Daun Cem-Cem, Daun Pegagan Dan Daun Katuk. *Media Ilm Teknol Pangan (Scientific J Food Technol.* 2018;5 No.1(1):19–26.
- [23]. Sari DN, Azizah A. PEMBUATAN MINUMAN INSTAN EFFERVESCENT DAUN PEGAGAN (*Centella asiatica* (L.) Urban) DENGAN PENAMBAHAN EFFERVESCENT MIX. *J Pangan dan Agroindustri.* 2021;9(4):216–26.