

An Examination of Medical Plant Resources for Possible Antioxidant Agents

Bhavika Thakur¹, Manali Patil¹, Smita Tandale¹, Gurumeet Wadhawa³, R. F. Inamdar²

Student Department of Chemistry, Veer Wajekar ASC College, Phunde, Uran, Raigad¹

Associate Professor Post Graduate Department of Chemistry, Veer Wajekar ASC College, Phunde, Uran, Raigad²

Assistant Professors Post Graduate Department of Chemistry, Veer Wajekar ASC College, Phunde, Uran, Raigad³

Abstract: *Plants from all over the world had been the challenge of current clinical inquiry into their potential as medications due to their superior pharmacological capabilities, financial viability, and sporadic toxicity. Reactive oxygen species (ROS) produced by endogenous and external stressors can alter the redox popularity of common cells (ROS). Despite the fact that endogenous antioxidants have a defense mechanism in place to stop ROS-mediated mobile damage, oxidative pressure occurs when oxidation outpaces the regulatory mechanisms. Damage-causing alterations in a variety of biomolecules, including proteins, lipids, and DNA, lead to a sustained increase in oxidative pressure, which in turn results in tissue damage and a wide spectrum of disorders. Antioxidants aid in the prevention of several diseases by reducing the harmful effects of ROS. Antioxidants can be found in both natural and artificial paper. You can consume natural antioxidants through vitamins in the form of produce, greens, spices, etc. It is known that two synthetic antioxidants, butylated hydroxyl toluene and butylated hydroxyl anisole, are hazardous to people. So, recent years have seen an increase in research towards non-toxic antioxidants.*

I. INTRODUCTION

Antioxidants can gradual down or stop the oxidation of different materials. Oxidation is regularly described because the mixture of any chemical or thing with oxygen. That is in which the time period "oxidation" comes from. The word is derived from the French phrase oxidizer, which changed into coined in 1787 with the aid of Guyton de Morveau and Antoine Lavoisier from the phrase's oxygen and acid. The 2 phrases oxide and acid had been combined into one word. Redox reactions are people who contain the simultaneous prevalence of techniques consisting of oxidation and discount that lead to benefit and loss The time period "oxidation" can talk to specific hinges depending with reference to studies. [1]. Antioxidants occur obviously in ingredients, even in very small quantities.

To repair typical high-quality and extend lifespan, additional amounts are applied to decrease oxidation via a process referred to as free radical termination [2]. Many biochemical and physiological processes inside the human body result in the manufacturing of reactive oxygen species (ROS), which are oxygen-centered loose radicals. Biomolecules which include DNA, proteins, lipids, and carbohydrates go through oxidative damage while those byproducts are produced in sufficient quantities. Many chronic situations can subsequently take place [3]. In addition, antioxidants defend in opposition to harm as a result of reduced ROS manufacturing and associated lipid peroxidation (LPO), DNA strand breaks, and protein degradation [4]. An effective antioxidant has to chelate the redox steel, quench loose radicals and be freely absorbed in physiologically equivalent doses [5]. mobile dying, tissue damage, atherosclerosis, arthritis, most cancers, damage to the critical worried device, cardiovascular disorders, weight problems, and coronary heart disorder are just some of the troubles with which free radicals are associated within the human frame. Antioxidants which could guard human lifestyles are required to combat such loose radical illnesses [6].

A loss of antioxidants, which can lessen or suppress free radicals, promotes the improvement of degenerative illnesses which includes cancer, coronary heart issues and neurological conditions such as Alzheimer's sickness. Antioxidants had been critical within the frame's protection processes. Consistent with massive studies, antioxidants are believed to reduce the danger of developing chronic sicknesses which includes most cancers and heart ailment.

Primary herbal assets of antioxidants consist of complete grains, culmination, and greens. Plant antioxidants such as phenolic acids, carotenes, nutrition C and diet E have been proven to reduce the risk of disorder [8]. Synthetic antioxidants used blanketed tert-butyl hydroquinone (TBHQ), butylated hydroxyl anisole (BHT) and propyl gallate

(PG) from foods. Due to the seasoned-oxidative houses of transition steel ions including copper, magnesium and iron, chelators are often used inside the food production enterprise. The protection of unique synthetic antioxidants as latent carcinogens has been the challenge of intense interest and debate for many years. No matter regulations on their use within the use, the synthetic antioxidants BHT, TBHQ, and PG remain on the list of materials commonly recognized as safe, regardless of the fact that they're now not used and need to be sanctioned in some jurisdictions. Because of protection concerns. Therefore, it's far imperative for the food enterprise and consumers to replace those artificial antioxidants with natural ones which might be famous and considered secure [2].

Natural antioxidants are eventually gaining popularity on an international scale. It has lengthily been believed that secondary metabolites with thrilling organic effects originate in the main from flora. Those chemical components regularly function the main components in various structural arrangements and homes [9]. These secondary metabolites include phenolic, flavonoids, phenolic glycosides, cyanogenic glycosides, and saponins, to name some examples [10]. Due to their mighty pharmacological consequences, business feasibility and minimal toxicity, the plants were the concern of latest clinical research performed international [11].

Natural products, in particular plants, had been used for a long time to deal with diverse illnesses. Land flowers had been used in India, China, Greece and Egypt seeing that historic instances. These floras have been used within the production of a astounding wide variety of new drug treatments. The usage of medicinal herbs has been mentioned in several cases. A brand-new place of have a look at is comparing the pharmacological effects of phytochemicals obtained from medicinal vegetation. According to current studies, antioxidants contained in medicinal plant life shield in opposition to the dangerous and deadly outcomes of unfastened radicals. in addition to the ability to scavenge loose radicals, antioxidants also have anti-allergic, anti-mutagenic, antibacterial and anti-carcinogenic houses [5,14].

Methods of assessment used to determine the number of antioxidants present in natural products

Phenolic compounds, which encompass phenolic acids, flavonoids, and tannins, showcase a variety of organic houses, consisting of anti-carcinogenic and anti-atherosclerotic results [15]. They also have antioxidant pastime. No matter the reality that a number of tests are available to measure antioxidant pastime. One method is the 1,1-diphenyl-2-picrylhydrazine (DPPH) radical scavenging take a look at. Other strategies encompass iron-decreasing antioxidant energy assay, oxygen radical absorbance capacity assay, radical scavenging general antioxidant capability assay, LPO method, superoxide anion scavenging pastime, and 2,2azine. The maximum famous and reliable techniques for evaluating antioxidant activity are the DPPH and ABTS techniques, each of which have lately gone through elaboration and change. this is a short clarification of several strategies.

DPPH Method

Blois first defined the DPPH free radical scavenging experiment in element in 1958, and next researchers made several minor modifications. One of the checks most often used to decide how nicely plant materials combat free radicals is that this. This method is predicated on the capability to scavenge DPPH by means of adding an antioxidant or radical to the DPPH solution, inflicting the solution to trade color. The most reliable supply of hydrogen atom whilst reacting with different chemicals is that this unfastened radical scavenger. The lower in absorbance at 515 nm is then used to calculate the antioxidant activity. By combining four mL of the fashioned answer with 1 mL of the pattern answer in methanol, the attention of the DPPH solution (0.1 mM) in methanol changed into modified. After half-hour, the absorbance of the aggregate is then measured at 517 nm. A significant lower inside the absorbance of the mixture is a sign of its high potential to lure unfastened radicals [7].

ABTS, a Radical Scavenging Method

Rice-Evans and Miller developed this approach in 1994, and Re et al. he later improved it. Met myoglobin is activated by way of hydrogen peroxide and ABTS•+ to form a thorough Cation as the idea for this modification.

Reduced-power assay

Using the decreasing energy method, the antioxidant activity of the plant extract is evaluated [26]. This process involves blending the extract with 1 mL of methanol, 5 mL of phosphate buffer (zero.2 M) pH 6.6, and five mL of 1% potassium ferricyanide. FTC approach.

The FTC Reagent Test

is a quick and low-cost manner to decide the full phenolic content material of a plant pattern. Many adjustments were made over time with none methodical optimization or reason. in this technique, zero.2 ml of plant pattern and zero.5 ml of diluted FTC reagent are mixed. The aggregate became kept at 25°C for three mins before including zero.2 ml of saturated sodium carbonate answer. After a further 120 minutes of standing, the absorbance of the response aggregate at 727 nm. [28]

Certain Species of Medical Plant with Antioxidant Activities

The blessings of medicinal plant life and the compounds they produce, which include their antioxidant, hypolipidemic, hypoglycemic and anticancer sports, have been growing considering the fact those ancient times. Here are a few examples of plant life which can be powerful antioxidants: real Ginge Zingiber officinale L., a perennial herb within the Zingiberaceae circle of relatives, has been used as a spice for over 2000 years [29]. a number of potential bioactive materials with useful pharmacological and organic properties had been recognized in lots of regions of the arena to improve the flavor and flavor of foods. Ginger rhizomes are regularly used as spices and sauces. For DPPH inhibition, the value (IC₅₀) was zero.64 g/ml. Ginger extract reduced more hydroxyl radicals than the powerful antioxidant quercetin the chemo protective and chemo preventive homes of 6-gingerol are normally related to its antioxidant ec663f0227e5f38fe44e4f96e08ef7 results. Removes unfastened proxy radicals. Within the presence of ascorbate, iron ions (Fe³⁺) and gingerol, the peroxidation of phospholipid liposomes changed into decreased. But, 6-gingerol has been proven to be a mighty inhibitor of NO synthesis and a valuable protector against peroxynitrite-mediated damage to lipopolysaccharide-activated macrophages. Nitric oxide, a reactive nitrogen species, is thought to control sign transduction and motive DNA harm that effects in most cancers' improvement.

c Gourd (sour) from the gourd own family has been used as food and medication due to the fact that historical times. Spokesmen M. Thais refer to the charantii as Mara, Karela and Balsam Pear. It grows in tropical and subtropical areas of India, Thailand, the center East, Malaysia and Africa [18].

Many useful bioactive compounds, a lot of that has amazing pharmacological activities including antibacterial, antiviral, and anticancer sports, had been produced via this nutritive plant [16]. in addition, it has strong hypolipidemic and anti-weight problems homes [20]. forty-seven]. one of the investigations involved M. whilst compared with diet E, which served as a standard, Charantia confirmed that each of these extracts, the ethanol and water extracts, had robust DPPH radical scavenging hobby. IC₅₀ values for diet E, ethanol extract and water extract had been 129.ninety-four mg/ml, 156.78 mg/ml and have a robust 172.21 mg/ml Citratuscyanophaga lovely perfume. Its aerial additives are commonly utilized in conventional remedy as a decoction or mixture. Orienting, caffeic acid, isoscoparin, isoorientin, isoorientin 2-O-rhamnoside, swertiajaponin, and chlorogenic acid were among the spectroscopic ally identifiable bioactive chemicals discovered in lemongrass, in step with some other experimental observe. on this study, two plant extracts had been used: one in methanol and the alternative in a methanol/water mixture. Unfastened radical scavenging outcomes have been evaluated the use of 1, 1-diphenyl-2-picrylhydrazyl (DPPH) radical, xanthine oxidase inhibition (XO) and superoxide anion scavenging.

II. CONCLUSION

Unfastened radicals, additionally called ROS, are considered the primary motive of cellular harm within the human frame. This injury can lead to a number of neurological disorders, digestive problems, infection, diabetes, viral infections and autoimmune illnesses. Unfastened radicals and ROS were implicated in the development of those horrible illnesses in line with several laboratory researches. Some of artificial antioxidants are delivered to processed ingredients to fight various diseases, but human checking out has shown that those additives have bad aspect consequences.

Which will manipulate the antioxidant capability of botanicals, ingredients, and different nutritional antioxidant supplements, lots attention has been paid to a number of homemade antioxidants that can be beneficial in decreasing these outcomes of oxidative stress? due to their abundance in secondary metabolites along with flavonoids and phenolics, many medicinal vegetation, inclusive of those in table 1 and Z. officinale, M. charantia, C. citrates, A. capillsveneris, D. metel, T. polium, P cerasoides, C. sativus, C. longa and A. Indica, have tremendous antioxidant

homes. Similarly, to antioxidant consequences, those substances additionally have antibacterial, antiviral, antifungal, antispasmodic and antidiabetic results.

ACKNOWLEDGMENT

All Authors are Thankful to the Principal of College Dr. P. G. Pawar sir and the RayatShikshan Sanstha for Providing the Support for Research work.

REFERENCES

- [1]. Becker EM, Nissen LR, and Skibsted, LH. Antioxidant Evaluation Protocols: Food Quality or Health Effects. European Food Research and Technology. 2004;219: 561-571.
- [2]. Renaud SC, Gueguen R., Schenker J., d'Houtaud, A., Epidemiology Alcohol and mortality in middle-aged men from eastern France. 1998;9: 184-188.
- [3]. Temple NJ, Nutri Res Antioxidants and disease: More questions than answers 2000;20:449-459.
- [4]. Nicoli MC, Anese M, Parpinel M. Influence of processing on the antioxidant properties of fruit and vegetables. Trends in Food Science & Technology 1999; 10:94-100 [https://doi.org/10.1016/S0924-2244(99)00023-0]
- [5]. Chun OK, Kim DO, Smith N, Schroeder D, Han JT et al. Daily consumption of phenolics and total antioxidant capacity from fruit and vegetables in the American diet. Journal of the science of Food and agriculture. 2005; 85: 1715-1724. [https://doi.org/10.1002/jsfa.2176]
- [6]. Kaur C, Kapoor HC. Anti - oxidant activity and total phenolic content of some Asian vegetables. International Journal Food Science + Technology 2002; 37: 153-161. [https://doi.org/10.1046/j.1365-2621.2002.00552.x]
- [7]. Leonard SS, Cutler D, Ding M, et al. Antioxidant Properties of Fruit and Vegetable Juices: More to the Story than Ascorbic Acid. Annals of Clinical & Laboratory Science, 2002; 32: 193-200.
- [8]. Halliwell B., Annual Review of Nutrition Antioxidants in human health and disease.1996;16:33-50.
- [9]. Esterbauer H, Rotheneder M, Striegl G, et al. Vitamin E and other Lipophilic Antioxidants Protect LDL against Oxidation. European journal of lipid science and technology 1989; 91: 316-324. [https://doi.org/10.1002/lipi.19890910805]
- [10]. Tijburg LBM, Wiseman SA, Meijer GW, Weststrate JA. Effects of green tea, black tea and dietary lipophilic antioxidants on LDL oxidizability and atherosclerosis in hypercholesterolaemic rabbits. Atherosclerosis 1997; 135: 37-47. [https://doi.org/10.1016/S0021-9150(97)00139-1]
- [11]. Thaipongl K, Boonprakob1 U, Cisneros-Zevallos L and Byrne DH. Hydrophilic and lipophilic antioxidant activities of guava fruits. Southeast Asian J trop med public health 2005; 36: 254-257. [PMID:16438219]
- [12]. Jia Z., Tang M., Wu J., he determination of flavonoid contents in mulberry and their scavenging effects on superoxide radicals Food Chem; 1999;64:555-599.
- [13]. Roberta Re, Pellegrini N, Proteggente A, Pannala A, Yang M, Rice-Evans C. Antioxidant activity applying an improved ABTS radical cation decolorization assay Free Radic Biol Med; 1999;26:1231-1237.
- [14]. Békro YA, Békro JAM, Boua BB, Tra BFH, Ehilé EE, Phytochemical Screening, Antioxidant and Antibacterial activity of Lepidium sativum seeds from Morocco. Rev. Sci. Nat. 2007; 4: 217-225.
- [15]. Huang B., Ban X.Q., He J.S., Tong J., Tian J., Wang Y.W., Hepatoprotective and antioxidant activity of ethanolic extracts of edible lotus (Nelumbo nucifera Gaertn.) leaves Food Chem. 2010;120:873-878.
- [16]. Oyaizu M. Jpn Assessment of the Quality and Shelf-Life in Enriched n3 PUFA Raw Beef Patties Using Dry Soybean Sprouts as Antioxidant J Nutr 1986; 103:413- 419.
- [17]. Fadili K., Amalich S., N'dedianhoua S K., Bouachrine M., Mahjoubi M., El Hilali F., Zair T. Phytochemical Screening and Antioxidant Activity of Moroccan Thymus satureioides Extracts Inter J Innov Sci Res, 2015;17:24-33.
- [18]. Harborne JB., In: Phytochemical Methods (Chapman and Hall, London); 1973.
- [19]. Schulz H, Baranska M. Identification and quantification of valuable plant substances by IR and Raman spectroscopy. Vibrational Spectroscopy. 2007; 43: 13-25. [https://doi.org/10.1016/j.vibspec.2006.06.001]

- [20]. Binet ML, Commereuc S, Chalchat JC, Lacoste J. Oxidation of polyterpenes: a comparison of poly α , and poly β , pinenes behaviours: Part I photo-oxidation. *Journal of Photochemistry and Photobiology A: Chemistry*. 1999; 125: 45-53. [[https://doi.org/10.1016/S1010-6030\(98\)00412-2](https://doi.org/10.1016/S1010-6030(98)00412-2)]
- [21]. Graßmann J. Terpenoids as Plant Antioxidants. *Vitamins & Hormones*. 2005; 75: 505-535. [[https://doi.org/10.1016/S0083-6729\(05\)72015-X](https://doi.org/10.1016/S0083-6729(05)72015-X)]
- [22]. Hegnauer R., *Chemotaxonomie der Pflanzen*, Birkhäuser Verlag, Basel, Stuttgart. An overview of the distribution and the systematic importance of plant substance 1973; 6:761-767.
- [23]. Talaty N, Takáts Z and Cooks RG. Rapid in situ detection of alkaloids in plant tissue under ambient conditions using desorption electrospray ionization. *Analyst*. 2005; 130: 1624-1633. [<https://doi.org/10.1039/B511161G>]
- [24]. Gaikar, P. S., Shivankar, V. S., Patil, P. A., Chavan, A. U., & Wadhawa, G. C. (2021). Preliminary Phytochemical Analysis and Antioxidant, Anti-Inflammatory Activity of *Dicliptera Ghatica* Santapau. *Int. J. of Aquatic Science*, 12(2), 4973-4980.
- [25]. N. A. Mirgane, A. Chandore, V. Shivankar, Y. Gaikwad and G. C. Wadhawa, "Phytochemical Study and Screening of Antioxidant, Anti-inflammatory Typhonium Flagelliforme," *Res. J. Pharm. Technol.*, 14(5), 2021, 2686–2690.
- [26]. Patil, Dinanath D., Gurumeet C. Wadhava, and Arun K. Deshmukh. "One Pot Synthesis of Nitriles from Aldehydes and Hydroxylamine Hydrochloride Using Ferrous Sulphate in DMF Under Reflux Condition." *Asian Journal of Chemistry* 24.3 (2012): 1401.
- [27]. Patil DD, Mhaske DK, Wadhawa GC. Green Synthesis of 3,4-dihydropyrimidinone using ferrous sulphate as recyclable catalyst, *Journal of Pharmaceutical Research and Opinion*, 2011; 1(6): 172–174.
- [28]. Nayak, Shubhada S., et al. "Green synthesis of the plant assisted nanoparticles from *Euphorbia neriifolia* L. and its application in the degradation of dyes from industrial waste." *Plant Science Today* 8.2 (2021): 380-385.
- [29]. S. S. Nayak, G. C. Wadhawa, V. S. Shivankar, R. Inamadar, and M. C. Sonawale, "Phytochemical Analysis and Dpph Antioxidant Activity of Root and Bark of *Syzygium Stocksii* (Duthie) Plant," *Eur. J. Mol. Clin. Med.*, 7(10), 2021, 2655–2668.