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Assessment of Pharmacognostic Parameters & Antioxidant Potential of Jatamansi (*Nardostachys jatamansi* (D. Don) DC.) Roots & Rhizomes by DPPH Method

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ABSTRACT

The plan of the current research was to explore the diverse pharmacognostic values and to assess the antioxidant action of the rhizomes of Nardostachys jatamansi (D. Don) DC. by the DPPH method. Aqueous, ethanol, petroleum ether and chloroform extracts of the rhizomes were arranged and applied to Phytochemical viewing which publicized the occurrence of carbohydrates, proteins, steroids, terpenoids, glycosides, flavonoids, and lipids. The antioxidant action of the plant extracts was also resolute by the DPPH process with ascorbic acid as benchmark. The grades obtained in this research hold the utilize of Nardostachys jatamansi (D. Don) DC. In herbal medication and it can be utilized as a potent antioxidant in the management of many diseases resulting from additional reactive oxygen species occurrence.

Keywords: Herbal medication, *Nardostachys jatamansi* (D. Don) DC., Antioxidant, DPPH.

INTRODUCTION

As of late characteristic items are turning into a necessary piece of human social insurance framework, on the grounds that there is a now well-known worry over poisonousness and symptoms of present day drugs. There is additionally an acknowledgment that normal prescriptions are more secure and allopathic medications are regularly incapable in a few aliments. Restorative plants existed even before individual showed up on the earth. Man's presence on this planet has been made

conceivable simply because of the indispensable pretended by plant realm in continuing his life. Since the down of human advancement, notwithstanding food crops, man developed herbs for his therapeutic needs [1].

Over the most recent couple of years, there has been an incredible development in the segment of homegrown medication. It is getting popularized in developing and developed countries owing to its natural origin and lesser side effects. In excess of 700 mono and polyherbal arrangements as decoction, tincture, tablets, and containers from in excess of 100 plants are in clinical use [2].

Nardostachys jatamansi (D. Don) DC. is a medicinal plant belonging to the family *Valerianaceae* found in Alpine Himalayas used as medicine. It is commonly known as Spikenard Indian nard in English, jatamansi in Hindi and Gujrati, Tatamamsi in Marathi and Jatamavasi in Kannada.

Different arrangements of *Nardostachys jatamansi* (D. Don) DC. extricate from organic product juice to dried natural product bits have been utilized generally around the world, especially for antiarrhythmic effects furthermore, it has been accounted for to show various exercises, for example bittertonic, stimulant, antispasmodic, diuretic, stomachic, laxative, and to treat epilepsy, hysteria, and convulsions. The hot aqueous extract of the root is utilized in mental disorders, insomnia, and disorders of blood and circulatory system.

Product of *Nardostachys jatamansi* (D. Don) DC. contains starch, gum, resin, essential oil, sugar, and rhizomes contain.5% oleum jatamansi, bitter matter, volatile essential oil, resin, sesquiterpee, jatamansone. Free radicals play an important role in development of tissue role and pathological events in living organisms [3,4] There are evidences that explain that increased uptake of fruits and vegetables reduce the risk of cancer [5,6]. This is attributed by antioxidants presents in fruits and vegetables [7-10]. The current research was conceded to assess the antioxidant efficacy of ethanol, petroleum ether, aqueous and chloroform extort of *Nardostachys jatamansi* (D. Don) DC. rhizomes, which assists in the expansion of novel drugs and formulations (Figure 1).

Figure 1: *Nardostachys jatamansi* (D. Don) DC.

MATERIALS AND METHODS

Chemicals and solvents

Solvents, chemicals and reagents of analytical grade or best possible grade supplied by Himedia Laboratories Pvt, Ltd., S.D. Fine Chemicals Ltd. India.

Collection of plant sample

Plant (*Nardostachys jatamansi* (D. Don) DC.) were acquire from neighbouring souk Jaipur. Sample was shadow dehydrated at area heat and pulverized involuntarily and surpass from a wire mesh number # 40.

Preliminary phytochemical investigation

Extraction: The dehydrated components of the plants were pulverized and extorted with aqueous and non-aqueous solvents by hot percolation process at a specified heat. After whole withdrawal, marc be squeezed to gather the micelle, blended in with the substance of RBF, separated and thought to obtain the concentrate. The shading and consistency of the concentrate were noted. This concentrate was additionally exposed to phytochemical examination [11].

Determination of physical constants: Preliminary extraction of plant material (*Nardostachys jatamansi* (D. Don) DC. root/rhizomes) is carried out with 95% ethanol using soxhlet extractor and then concentrated. The extract obtained is subjected for preliminary physicochemical investigation such as loss on drying (LOD), ash values (Total ash value, Water soluble ash value, Acid insoluble ash value), extractive values (Alcohol soluble extractive value, Water soluble extractive value) and fluorescent analysis [12-18].

Qualitative chemical tests: Synthetic tests are led on the concentrate of the plant test and furthermore of the powdered type of the plant tests utilizing standard techniques. The test arrangement was set up and exposed to the Molish's test, Fehling's test, Benedict's test, Barfoed's test, Cobalt-chloride test, Tests for Non-Reducing Sugars, The tannic basic analysis (For Carbohydrates), Biuret test, Million's test, Xanthoprotein test (For protein-containing tyrosine or tryptophan), Precipitation tests (For Proteins), the Salkowski response, Libermann-Burchard test, Libermann's tests (For Steroids), Ninhydrin test, Test for Tyrosine, Test for tryptophan (For Amino Acids), Baljet's test, Bromine water test, Legal's test (For cardenoloids), Test for deoxysugars (KellarKillani test), Libermann's test for Cardiac Glycosides. The Borntrager's test, Modified Borntrager's test for anthraquinone glycosides. The Grignard's test for Cyanogenetic glycosides. The Foam test, Foaming list, Haemolytic test for Saponin Glycosides, fluorescence test for Coumarin Glycosides (For Glycosides), Dragendorff's test, Mayer's test, Hager's test, Wagner's test (For Alkaloids), Shinoda test and Ferric chloride test (For Flavonoids), Test for Vitamin A and Vitamin D (For Vitamins), Foam test, Haemolysis test, Test for steroidal saponins, Test for triterpenoid and saponins (For Saponins), 5% $FeCl_3$ arrangement, Lead acetic acid derivation arrangement, Bromine water test, Acetic corrosive arrangement, Dilute iodine arrangement tests (For Tannins and phenol mixes) [19].

Antioxidant activity by DPPH method

All the extracts were tested for antioxidant activity by DPPH radical scavenging method. Serial dilutions were performed with the stock solution (10 mg/ml) of all extracts of the plant (*Nardostachys jatamansi* (D. Don) DC. root/rhizomes). Diluted solutions (2 ml each) were mixed with DPPH (2 ml) and allowed to react. The UV absorbance was recorded at 517 nm

and the RC_{50} value was calculated in µg/ml for each extract. Ascorbic acid was used as standard antioxidant drug.

The percentage of DPPH scavenging activity was determined by:

$$A = (A_o - A_e) \times 100 / A_o$$

Where, A represents a percentage reduction of the DPPH, A_0 is an initial or blank solution absorbance and Ae is an absorbance value for sample concentration in the absence of DPPH solution.

This activity also expressed as the inhibition concentration at 50% (EC_{50}/ IC_{50}/ RC_{50}). The RC_{50}/ EC_{50} value, defined as the amount of the sample sufficient to elicit 50% reduction of the initial DPPH concentration, was calculated from the linear regression of plots of concentration of test compounds (µg/mL) against the mean percentage of antioxidant activity obtained from the three replicate tests. The free radical scavenging activity of ascorbic acid (Vit C) was also measured under the same condition to serve as positive control [20-22] (Tables 1-4).

RESULTS

Table 1: Physical characteristics of *Nardostachys jatamansi* (D. Don) DC.

S. No.	Parameter	*Nardostachys jatamansi* (D. Don) DC. root/rhizomes
1	LOD	11.95% w/v
2	Ash Value	
	Total residue	5.76% w/w
	Acid insoluble residue	2.45% w/w
3	Extractive Values	
	Aqueous	3.51%
	Alcohol	3.14%
4	Fluorescence Analysis	Blue fluorescence

Table 2: Summary of solvent used for extraction & % yield.

S. No.	Drug	Weight of drug Taken	Solvent	Volume of Solvent Taken	% yields after Extraction
1	*Nardostachys jatamansi*	900 grams	Petroleum ether	2.5 lit.	6.11
2		900 grams	Chloroform	2.5 lit.	4.33
3		900 grams	Ethanol	2.5 lit.	3.8
4		900 grams	Aqueous	2.5 lit.	11.6

Table 3: Chemical Test of *Nardostachys jatamansi* (D. Don) DC.

S. No.	Test	Pet. Ether Extract	Chloroform Extract	Alcohol Extract	Aqueous Extract
I	Test for Carbohydrate				
A	Molish Test	-	-	+	+
B	Test for reducing sugars				
	Fehling Test	-	-	-	+
	Benedict test	-	-	-	+

C	Test for Monosaccharide				
	Barfoeds Test	+	+	-	-
D	Test For Hexose Sugars				
	Cobalts Chloride test	-	-	-	+
E	Test for Non- Reducing Sugars	-	-	-	+
F	Test for Non- Reducing polysaccharide				
	Iodine test	+	+	+	+
	Tannic acid test	+	+	+	+
II	Test for Proteins				
	Biuret test	-	-	+	+
	Millon's test	-	-	+	-
	Xanthoprotein	+	+	+	+
	Test for proteins containing Sulphur	-	-	-	-
	Precipitation test	+	+	+	+
III	Test for Amino Acid				
	Ninhydrin test	+	+	+	+
	Test for tyrosin	-	+	+	-
	Test for tryptophan	-	-	+	-
	Test for cysteine	+	-	+	+
IV	Test for Steroids				
	Liebermann-Buchard	-	-	-	-
	Liebermann reaction	-	+	-	-
V	Test for Terpenoids				
	Liebermann-Buchard	-	+	-	-
	Liebermann reaction	-	+	-	-
VI	Test for Glycosides				
A	Test for Cardiac Glycoside				
	Baljet test	+	+	+	+
	Legal's test	-	-	+	-
	Test for deoxy sugar (Keller killani test)	+	+	+	+
	Liebermann's test (Bufadienolides)	+	-	+	+
B	Test for Anthraquinone glycoside	-	-	+	-
C	Test for Saponin Glycoside	+	+	+	+
D	Test for Coumarin Glycoside	-	-	+	-
VII	Test For Flavonoids				
	Ferric chloride test	-	+	+	-
	Shinoda test	+	+	+	+

	Alkaline reagents	+	-	+	+
	Lead acetate test	+	+	+	+
VIII	Test for alkaloids	-	+	+	+
IX	Test for Tannins & Phenolic cpd.	+	+	+	+
X	Test For Lipids	-	-	+	-

Antioxidant Activity by DPPH Method

Anti-oxidant activity is carried on all the fractions of plant extract to assess their efficacy in tissue healing. The cell reinforcement action of antioxidative agents has been credited to different systems, for example, the anticipation of chain commencement, an official of progress metal particle impetus, deterioration of peroxides, and avoidance of proceeded with hydrogen deterrent, reductive limit, and radical rummaging. The maximum absorption of a stable DPPH radical in ethanol is at 517nm. They reduce in absorbance of DPPH fundamental caused by anti-oxidants is because of the reaction between anti-oxidants molecules and radical. Therefore, DPPH is frequently utilized as a substance to evaluate anti-oxidant activity.

Table 4: Antioxidant Activity of *Nardostachys jatamansi* (D. Don) DC. by DPPH method.

S. No.	Drug	Extract	RC_{50} value (mg/ml)
1	*Nardostachys jatamansi* (D. Don) DC.	Petroleum ether	55.54
2		Chloroform	89.65
3		Alcohol	77.56
4		Aqueous	103.25
5	Ascorbic acid	-	40.12

DISCUSSION

Nardostachys jatamansi (D. Don) DC. Is a therapeutic plant from the Family Valerianaceae, used as a Indian traditional therapeutic agent. The Phytochemical exploration or Qualitative assessment of *Nardostachys jatamansi (D. Don) DC.* roots/rhizomes, the different physical parameters were evaluated. The present examinations were led to assess the 11.95% w/v LOD, residue standards (5.76%w/w total ash and 2.45%w/w acid insoluble ash), extractive values (Aqueous 3.505%, Alcohol 3.136%). The Fluorescence Analysis has given blue coloured fluorescence which was observed under the UV radiation lamp to gain more details about the *Nardostachys jatamansi (D. Don) DC.* Roots/rhizomes.

Therefore, chemical tests were performed on 4 various extracts of the roots/rhizomes to estimate the presence of different Phytoconstituents as aqueous extract shows, it contains carbohydrates (Reducing sugars, Monosaccharides, Non-Reducing Sugars), proteins, amino acids(tyrosine, tryptophan & cysteine), alkaloids, glycosides (cardiac glycoside, saponins glycoside, anthraquinones glycoside), flavonoids alkaloids and tannins. Chloroform extract of roots/rhizomes proved the presence of sterols, triterpenoids and lipids.

The antioxidant potential was determined the DPPH method taking ascorbic acid as standard. All the four extracts of the *Nardostachys jatamansi (D. Don) DC.* roots/rhizomeshave shown antioxidant efficacy in comparison to the standard drug (Ascorbic acid). The standard ascorbic acid has given the RC_{50} value for the DPPH method was 040.12 µg/ml. The RC_{50} estimation of the prescription expels was viewed as chloroform 089.65 µg/ml, watery 103.25 µg/ml, alcohol 077.56 µg/ml, and

Petroleum ether 055.54 µg/ml, which shows the basic ability of *Nardostachys jatamansi* (D. Don) DC. as a cell fortification pro.

CONCLUSION

The extracts of *Nardostachys jatamansi* (D. Don) DC after concentration is first subjected for preliminary physical and phytochemical investigation to assess the quality of plant material and understand the nature of active constituent's present. After preliminary studies all the 4 extracts were subjected for antioxidant activity by DPPH method to guide us in the selection of extract fraction which will probably has the desired activity. Therefore, *Nardostachys jatamansi* (D. Don) DC root/rhizome can be utilized as a possible base for the growth of an antioxidant means. Results of phytochemical investigation have shown the occurrence of various phytoconstituents like amino acids, glycosides, sterols, proteins, cardiac glycosides, triterpenoids, carbohydrates, lipids and flavonoids.

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REFERENCES

[1]. Kokate, C.K., Purohit, A.P., Gokhale, S.B., Text Book of Pharmacognosy. Nirali Prakashan, Pune, **1996**.4:155-161.

[2]. Ram, V.J., Herbal Preparations as source of hepatoprotective agents. *Drug News Prospect*,**2001**.14(6):353-363.

[3]. Kehrer, J.P., Free radicals as mediators of tissue injury and disease. *Crit Rev Toxicol*, **1993**.23:21-48.

[4]. Halliwel, B., Gutteridge, J.M.C., Free radicals in biology and medicine. Oxford University Press,Oxford, **1999**.3rd Ed.

[5]. Goodwin, J.S,. Brodwick, M., Diet, aging and cancer. *Clin Geriatr Med*, **1995**.11:577-589.

[6]. Steinmetz, K.A., Potter, J.D., Vegetables, fruit and cancer prevention: A review. *J Am Diet Assoc*, **1996**.96:1027-1039.

[7]. Stahelin, H.B., Gey, K.F., Eichholzer, M., et al. Plasma antioxidant vitamins and subsequent cancer mortality in the 12-year follow-up of the prospective basel study. *Am J Epidemiol*, **1991**.133:766-775.

[8]. Steinberg, D., Antioxidants and atherosclerosis: a current assessment. *Circulation*, **1991**. 84:1420-1425.

[9]. Willett, W.C., Micronutrients and cancer risk. *Am J Clin Nutr*, **1994**.59:S265-S269.

[10]. Asli., Semiz., Alaattin. S., Antioxidant and chemoprotective properties of Momordica charantia L.L. (bitter melon) fruit extract. *African J Biotech*, **2007**.6 (3):273-277.

[11]. Chatterjee, A., Basak, B., Saha, M., et al. Structure and stereochemistry of nardostachysin, a new terpenoid ester constituent of the rhizomes of *Nardostachys jatamansi*. *J Nat Prod*, **2000**.63(11):1531-1533.

[12]. Prabhu, V., Karanth, KS., Rao, A., Effects of *Nardostachys jatamansi* on biogenic amines and inhibitory amino acids in the rat brain. ***Planta Med***, **1994**.60(2):114-117.

[13]. Dixit, V.P, Jain, P., Joshi, S. C., Hypolipidaemic effects of Curcuma longa L and *Nardostachys jatamansi*, DC in triton-induced hyperlipidaemic rats. *Indian J PhysiolPharmacol*, **1988**.32(4):299-304.

[14]. Sarbhoy, A.K., Varshney, J.L., Maheshwari, M.L., et al. Efficacy of some essential oils and their constituents on few ubiquitous molds. *Zentralbl Bakteriol Natur wiss*, **1978**.133(7-8):723-725.

[15]. Rucker, G., Tautges, J., Sieck, A., et al. Isolation and pharmacodynamic activity of the sesquiterpene valeranone from *Nardostachys jatamansi* DC. *Arzneimittel for schung*, **1978**.28(1):7-13.

[16]. Rao, E.V., Raju, N.R., Two flavonoids from *Tephrosia purpurea*. *Phytochemistry*, **1984**. 23(10):2339-2342.

[17]. https://www.hort.purdue.edu/newcrop/duke_energy/dukeindex.html

[18]. Ahmad, V.U., Ali, Z., Flavonoids of *Tephrosia purpurea*. *Fitoterapia*, **1999**.70(4):443-445

[19]. Saxena, V.K., Choubey, A., A novel neo flavonoid glycoside from *Tephrosia purpurea* stem. *Fitoterapia*, **1997**.68(4):359-360.

[20]. Choudhary, G.P., *In vitro* antioxidant studies of the ethanolic extract of *Tephrosia purpurea* L. *Ancient Science of Life*, **2007**.27:26.

[21]. Ashokkumar, D., Narayana, T.V., Mazumder, U.K, et al. Exploration of Diuretic Potential and Electrolyte Excretion of *Tephrosia purpurea* (Fabaceae) in rats. *J Diet Suppl*, **2012**.9:9-18.

[22]. Rangama, B.N.L.D., Abayasekara, C.L., Panagoda, G.J., et al. Antimicrobial activity of *Tephrosia purpurea* (Linn.) Pers and *Mimusop selengi (*Linn.) against some clinical bacterial isolates. *J Natn Sci Foundation Sri Lanka*, **2009**. 37:139-145.