



“Management of Oxidative Stress using Selaginella Bryopteris and Opuntia Dillenii plant extracts”

Pratibha A. Saxena^{1*}, Dr. Asha Verma²Dr.Namrata S.Rajawat³

Research Scholar, Department of Chemistry, BU, Bhopal, India

Professor, Department of Chemistry, GSCC, Benazir, Bhopal, India

Asst.Prof., Department of Applied Chemistry, SATI, Vidisha, India.

Abstract

Selaginella bryopteris is ordinarily known as 'Sanjeevani', is a lithophyte with striking recovery capacities and restorative properties. It is for the most part used for soothing injuries and capricious female cycle, uterine issues, and other inside injuries. It contains a collection of discretionary metabolites like alkaloids, phenol, terpenoids, etc on account of which it can go about as cell fortifications, relieving, against illness, antagonistic to negatively vulnerable, antimicrobial, antifungal, antibacterial, antiviral, etc. Opuntia dillenii is used in Asian standard prescriptions, especially in China. An earlier report on the chemical constituent, cell support, cytotoxicity, and antiviral development of O. dillenii bloom methanolic extract.

Key words: Oxidative stress, Plants, Activity, Sanjeevani, Methanolic extract.

1. Introduction

Selaginella bryopteris is a pteridophytic plant that is known for its groundbreaking restoration limits. The dry plants have been used as a working answer for a couple of human startling issues for quite a while in India, particularly in the familial districts ^[1]. Quickly, the helpful occupations of S. bryopteris incorporate (i) easing from hot waves and consuming sensation during pee; (ii) reconstructing to the consistency of ladylike irregularities and given from a distance to pregnant individuals for straightforward transport; and (iii) for reestablishing jaundice. Selaginella is a lithophytic xerophyte that creates on the slants of tropical districts, particularly the Arawali mountain scenes from east to west in India ^[2]. The plants grow luxuriously during storms showing an extravagant green smooth scene. During summer the plants go through ridiculous evaporating. The fronds contort, become dry, and all things considered, dead. In this condition, they seem like a shut grasp hand from now on every now and again alluded to in Unani as 'punjemariam' or 'hathazori' ^[3]. The dry plants when left in water spread out their fronds, become green, and got back to dynamic life. A couple of sorts of Selaginella have been used true to form normal prescriptions.

By far most of the restorative properties of the dissimilar sorts of Selaginella have been examined under non-neighborhood conditions that fuse extraction of the plant satisfied using regular solvents. Nearby systems for use of these plants soaked them for water until further notice, preferably in an earthen pot. The plants are discarded and water-containing liquid depleting is filtered and taken orally to fix the recently referenced unforeseen issues ^[4]. The fundamental objective of our endeavor is to convey exploratory verification of the

supportive ampleness of this zest in its nearby method as used by people. Considering its superb supportive properties, *S. Dryopteris* has in like manner been known as 'Sanjeevani'. It is, subsequently, hypothesized that this flavor has an advancement propelling action as well as cautious action against pressure-induced cell passing that expects essential parts in organismal turn of events and improvement, tissue homeostasis, and upkeep of genomic uprightness [5, 6].

Improper apoptosis has been definitively shown to achieve a couple of human ailments including threatening development, neurodegenerative infections such as Alzheimer's atherosclerosis', Parkinson's, etc. As a result, we anticipated using a test cell system incorporating Sf9 insect cells and various mammalian cells in philosophy to examine the flavor's restorative features in its neighborhood sort of utilization [7].



Figure 1: S. Bryopteris

People are hunting for medicines in similar situations as they did in the past when they were looking for rescue from contaminations [8]. The usage of beneficial plants began instinctively, and there was a deficiency of understanding regarding the causes of diseases and how plants may be used to treat them. In the sixteenth century, the beginning of incorporation was the inclusion of plants as a central focus again for the treatment and prophylactic of illnesses [9]. Currently, it is represented that around 2000 helpful plant packs exist all through the world, everybody has their amazing clinical worth or compound piece. Plants stand apart to the point of being seen in made countries as significant blends with palatable practicality and security in treating dissimilar ailments. It has been represented that more than 3.3 billion individuals in low-people countries use helpful plants reliably [10]. An evaluation by the creation prosperity affiliation (WHO) exhibited that around 80% of African individuals rely upon normal prescriptions for the behavior of numerous ailments [11]. Nowadays numerous pieces of investigation have revealed manifestations of manufactured meds and this complete numerous people poster the supportive plants' substance drugs. Made accidental impacts even may demonstration up at their alright piece as well as in mix with various prescriptions. Drug disagreeable effects amaze around 2 million patients in the United States yearly and cause approximately 100,000 passings. In such a way, the showcase of very horrible effects made the US Food and Drug Administration cautioning board blacklist the well-known pain relievers Percocet and Vicodin [12]. In this remarkable circumstance, it made examiners from one side of the planet to the next direct unique investigate regarding the matters of restorative plants among these explore, review concentrates on imparting the value and meaning of unequivocal normal things expect imperative parts [13].

Opuntia dillenii (OD), a Cactacea plant that fills in dry and desert situations, is a mind-bogglingly useful taste, a shrub that fills in dry and sandy conditions with a height of roughly 1 to 1.8 meters. Furthermore, OD contains really beautiful flowers with an amazing color thanks to betalain, as well as vital produced chemicals such as betanin, carbohydrate pieces of galactose, and arabinose [14]. 3-O-methyl quercetin, kaempferide, kaempferol, isorhamnetin, quercetin, beta-sitosterol, 4-ethoxy-6-hydroxymethyl-alpha-pyrone, opuntisterol, opuntisteroside, taraxerol, friedelin, methyl linoleate, opuntisterol, opuntisteroside, taraxerol, fri 7-oxositosterol, 6-hydroxystigmast4-one-3-one, daucosterol, monetary damaging, methyl robotize, as well as soddenness, protein, Brix, sharpness, glucose, fructose, molasses, and minerals [15]. The organisms OD, Nagphana, isn't precisely explored, despite the fact that its guarded effects have been represented including torment lessening, quieting,

fanatic looking through activity, and against spermatogenic sway, as fine as being particularly recognized as a foe of diabetic and relieving expert from previous numerous years [16]. In terms of conventional usage, it has been proposed that the outcome of OD may be valuable as anaction for gonorrhea, beating hack, and blockage, as fine as reducing bile emanation, convulsive hack, and wheezing. Furthermore, the soil's leaves have been charity as a remedy for wounds and irritation, as fine as a therapy for ophthalmic illnesses [17].



Figure 2:Opuntia Dillenii

2. Characteristics of Selaginella Bryopteris and Opuntia Dillenii

The development of Ayurvedic and customary drugs and as healthy as the augmentation in western botanists helped in the ID, quality assurance, and reasonable treatment of harsh prescriptions. Standard data is generally called local data [18]. It overall insinuates the long-standing traditions and practices of common, local, and close by networks and consolidates their understanding, data, and illustrations. It routinely takes a sort of stories, legends, tales, services, tunes, and, shockingly, standard guidelines and may be passed orally, beginning with one age then against the following [19]. Traditional data is consistently connected with the remedial belongings of the plants and depends upon the biodiversity of the spot. It is rich in organizations with old culture and city foundations.

A. Selaginella Bryopteris

SANJEEVANI (from an honest perspective importance something that offers life; jeeva = life) Most astounding and most soughtafter zest in Indian Mythology Existence and character are questionable Miracle flavor - in light of its alleged opportunities for 'reestablishing' life. Out of the central posting of around 17 plant species which could be Sanjeevani only three last species were shortlisted which were Cressa cretica, Selaginella bryopteris, and Desmotrichum fimbriatum. Out of which right now Selaginella bryopteris is considered as Sanjeevani. Selaginella existed before 300 million years and goes under a get-together of plants which were the essential vascular plants in the domain [20].

Biological characterization of Selaginella Bryopteris

Domain: Plantae

Division: Lycopodiophyta

Class: Isoetopsida

Demand: Selaginellales

Family: Selaginellaceae

Class: Selaginella

Species: apoda, asprella, bifida, biformis, bigelovii, braunii, bryopteris, canaliculata, carinata, cinerascens

The general characteristics of Selaginellaceae gathering of which Selaginella bryopteris is generally called Spike Moss Family consolidate plants that fill in or on rocks and feed off plant life, supplements in stormwater, disorder, and, shockingly, their own departed tissue [21]. These typically have dichotomously spread stems, microphylls (little leaves), substitute, opposite or whorled, direct, deveined, a share of the time dimorphic (two sizes), with scale-like ligule (early deciduous). Selaginellas are slithering or ascending plants with basic, scale-like leaves on extended stems from which roots grow. The flowers are heterosporous (megaspores and microspores) and have ligules, which are scale-like outgrowths at the improper of each microphyll and sporophyll's top surface. Surprisingly for lycopods, each microphyll has a developing vascular vasculature [22]. Roots bore on wiry rhizophores arising out of forks in stems. Sporangia are borne in axils of productive leaves (sporophylls). Plants are heterosporous. The current example of Selaginella fuses various stages having scaled down sporangia, megasporangia, etc Microspores are pretty much nothing, different, megaspores colossal, 4 for each megasporangium [23]. The gametophyte makes inside the megasporResults presented in figure 2 of Selaginella bryopteris is n=10.Selaginella should be fruitful as follows[24]:

- 1) Relief heatstroke and the consuming sensation during pee
- 2) Restoring ladylike irregularities to run of the mill
- 3) Helping in the basic movement of pregnant women (in restricting the work torture)
- 4) In the treatment of Jaundice.

B. Opuntia Dillenii

The desert verdure known as nopales are extraordinarily rapidly creating plants that, reliant upon the species, produce normal substances that are really grand. In any situation, as they change so well to various living spaces, today there are particular that are seen as prominent, and one of them is the Opuntia dillenii, as of now known as Strict opuntia.

This is a creature type that, seen with the independent eye, is particularly reminiscent of the similarly meddlesome Opuntia ficus-indica. Its stalks (changed leaves) are basically level, rather blue-green, and when prepared the regular items are red-pink [25].

The now Strict opuntia, is a neighborhood kind of the US, Mexico, and Cuba, known by the ordinary designation of the oceanfront desert plant from Las Tunas. It can show up at a statue of 1 to 3 meters, with a much spread shrubby and creeping bearing. The stalks or leaves are colossal, up to 30cm long through up to

15cm wide, praise to ovulated and smoothed, with for the maximum part segregated brown areoles, from which anywhere around one yellowish spines sprout.

It produces single yellow to yellowish-orange blooms with a size of around 5 cm long during spring-summer and fructifies towards the beginning of reap time. Its normal items are purple-red when prepared, have a changed egg shape, are around 3-4cm long, and contain 60 to 180 seeds. Shielded by a glue furthermore sensible for human usage and with which birds and various animals appreciate. These seeds can remain appropriate for more than 10 years until the fitting conditions are met for their germination [26].

It is an incredibly rapidly creating desert vegetation that was familiar with Europe in the 1874th century by the victors of the Americas. In Spain it is understood that it has been around since XNUMX, the year it was in the south of the Iberian Peninsula, unequivocally in the domains of Huelva and Almería. Starting there up to this point, has sorted out some way to naturalize in Andalusia, filling in thistles, upholds and in dry climate areas [27].

3. Oxidative Stress

The proximity on the link between oxidative tension and if lifestyle-related meals has grown prominent. The term "oxidative tension" refers to a "condition in which oxidation exceeds the cell support structures in the body, resulting in a lack of concordance between them." It not only intends hazardous occurrences, such as lipid peroxidation and oxidative DNA harm, but also physiologic change peculiarities and the rule of intracellular signal transmission. According to a clinical point of view, if biomarkers that indicate the amount of oxidative stress were available, such markers would be critical for experts to get an understanding of the hypochondriac components of various conditions and review the sufficiency of medications.

From a natural viewpoint, several oxygen-decided free innovators have been standing apart for the following reasons: Various unique oxygen species are created in the body during the most well-known method of utilizing oxygen. Because the body is equipped with puzzling components that kill dynamic oxygen species and free progressives, these oxygen assimilation symptoms are not a hazard to the body during physiological settings.

4. The Management of Oxidative Stress

As the name, 'Sanjeevani' proposes the plant concentrate should enliven basic actions in cells/tissues. This drove us to guess that a watery concentrate of *S. bryopteris* may have an advancement progressing and protective movement against explicit strain started cell downfall. We finished testing refined bug *S. frugiperda* (Sf9) and mammalian mouse macrophage (BMC2) cells to test its actual limit.

Over the latest a few years, ordinary phytochemicals of plants, for instance, *Opuntia ficus indica* (L.) Mill. (OFI) and *Opuntia dillenii* Haw. (OD) have tended to one of the investigation fields around which standard specialists cultivated a staggering revenue for their guarded ramifications for human prosperity. It is understood that the excess of particularly precarious iotas like responsive oxygen species (ROS) and other free progressives is associated with the debasement of regular particles (proteins, lipids, polysaccharides, DNA, and RNA), empowering, running against the standard, biochemical cycles drew in with the etiology of afflictions like illness, diabetes, and ischemia. Lately, a couple of examinations have related an obvious level of ROS with a decrease in sperm quality, focusing experts at work of oxidative load on desolateness, a certain issue universally. Regardless, spermatozoa will as a general rule produce free progressives not soon after pressure conditions, for example during a freeze-thaw out cycle, yet moreover physiologically, since a palatable ROS center is basic for treatment. The ROS responsibility is vital for the capacitation, the acrosome reaction, the constancy of mitochondrial sheath, and motility.

5. Conclusions and Future Work

Several species of Selaginella are also used as food (raw vegetables), ornamental plants, handicrafts materials as well as socio-cultural and packaging materials. The utilization of Selaginella bryopteris (L.) Bak. is limited compared to the other species. The herb has many therapeutic properties and is traditionally used by local people in curing heatstroke and the burning sensation during urination, to control menstrual irregularities, helping in easy childbirth to minimize the labor pain, and in the treatment of Jaundice.

The study on the in vitro antioxidant and antiviral properties of extract prepared from *O. dillenii* flowers showed effective antioxidant properties by DPPH assay. We also found that methanol extract of *O. dillenii* flowers exhibit significant antiviral activity against vaccinia and herpes simplex virus type 1 and 2.

References

- [1] M. Sasaki and O. Honmou, "Mesenchymal stem cells," in *Cell Therapy against Cerebral Stroke*, Springer, Japan, Tokyo, 2017.
- [2] C. J. Hunt, "Cryopreservation: vitrification and controlled rate cooling," *Methods in Molecular Biology*, vol. 1590, pp. 41–77, 2017.
- [3] O. W. Gramlich, A. J. Burand, A. J. Brown, R. J. Deutsch, M. H. Kuehn, and J. A. Ankrum, "Cryopreserved mesenchymal stromal cells maintain potency in a retinal ischemia/ reperfusion injury model: toward an off-the-shelf therapy," *Scientific Reports*, vol. 6, article 26463, 2016.
- [4] Z. Yuan, S. D. S. Lourenco, E. K. Sage, K. K. Kolluri, M. W. Lowdell, and S. M. Janes, "Cryopreservation of human mesenchymal stromal cells expressing TRAIL for human anti-cancer therapy," *Cytotherapy*, vol. 18, pp. 860–869, 2016.
- [5] L. A. Marquez-Curtis, A. Janowska-Wieczorek, L. E. McGann, and J. A. W. Elliott, "Mesenchymal stromal cells derived from various tissues: biological, clinical and cryopreservation aspects," *Cryobiology*, vol. 71, pp. 181–197, 2015.
- [6] K. G. Jain, S. Mohanty, A. R. Ray, R. Malhotra, and B. Airan, "Culture and differentiation of mesenchymal stem cell into osteoblast on degradable biomedical composite scaffold: in vitro study," *The Indian Journal of Medical Research*, vol. 142, pp. 747–758, 2015.
- [7] Muralidhara CG. Insights on the neuromodulatory propensity of Selaginella (Sanjeevani) and its potential pharmacological applications. *CNS Neurol Disord Drug Targets*. 2014; 13(1):82-95.
- [8] Sainkhediya J, Ray S. Studies on sacred groves of Nimar region, Madhya Pradesh, India, *Indian Journal of Plant Sciences*. 2014; 3(1):64-69.
- [9] Singh BP, Upadhyay R. Medicinal Pteridophytes of Madhya Pradesh, *Journal of Pharmacognosy and Phytochemistry*. 2014; 3(3):173-176.
- [10] A. Bissoyi and K. Pramanik, "Effects of non-toxic cryoprotective agents on the viability of cord blood derived MNCs," *Cryoletters*, vol. 34, no. 5, pp. 453–465, 2013.
- [11] Singh H, Agnihotri P, Pande PC, Husain T. Role of Traditional Knowledge in Conserving Biodiversity: A Case Study from Patal Bhuvneshwar Sacred Grove, Kumaon Himalaya, India. *J Biodivers Manage Forestry*. 2013; 2:2.
- [12] F. Ginani, D. M. Soares, and C. A. Barboza, "Effect of a cryopreservation protocol on the in vitro yield of adipose-derived stem cells," *Revista Brasileira de Cirurgia Plástica*, vol. 27, pp. 359–363, 2012.

- [13] N. D'souza, J. S. Burns, G. Grisendi et al., "MSC and tumors: homing, differentiation, and secretion influence therapeutic potential," *Advances in Biochemical Engineering/Biotechnology*, vol. 130, pp. 209–266, 2012.
- [14] Antony R, Thomas R., "A mini review on medicinal properties of the resurrecting plant *Selaginella bryopteris* (Sanjeevani)", *International Journal of Pharmacy & Life Sciences*. 2011; 2(7):933-939.
- [15] Sivanandham, Velavan, "Phytochemical Techniques - A Review", *World Journal of Science and Research*. 1. 80-91, 2015.
- [16] AOAC, Vitamins and other nutrients, "In Official Methods of Analysis of the Association of Official Analytical Chemists", 14th Edition (William S, ed.), AOAC, Virginia; pp. 838 – 841, 1984.
- [17] Ashis, "Herbal folk remedies of Bankura and medinipur districts, west Bengal", *Indian Journal of Traditional knowledge* 2 (4): 393-396, 2004.
- [18] Barkat M. Z., Shehab S. K., Darwish N., Zahermy E. I., "Determination of ascorbic acid from plants. *Analyst Biochem*", 53: 225-245, 1973.
- [19] Bimakr M, "Comparison of different extraction methods for the extraction of major bioactive flavonoid compounds from spearmint (*Mentha spicata* L.) leaves", *Food Bioprod Process* 2010; 1-6, 2005.
- [20] Das K, Tiwari RKS, Shrivastava D. K., "Techniques for evaluation of medicinal plant products as antimicrobial agent: Current methods and future trends", *Journal of Medicinal Plants Research* 2010.
- [21] J. M. Crook and E. Tomaskovic-Crook, "Culturing and cryobanking human neural stem cells," *Methods in Molecular Biology*, vol. 1590, pp. 199–206, 2017.
- [22] A. Pavón, I. Beloqui, J. M. Salcedo, and A. G. Martin, "Cryobanking mesenchymal stem cells," *Methods in Molecular Biology*, vol. 1590, pp. 191–196, 2017.
- [23] T. A. Lyons, X. F. Amouretti, P. G. Held, and J. J. Naleway, "Development of a live-cell based reactive oxygen species (ROS) assay for use in high-content screening of drug candidates using the BioTek synergy mx microplate reader," vol. 807, 2008.
- [24] L. Dalcin, R. C. Silva, F. Paulini, B. D. M. Silva, J. P. Neves, and C. M. Lucci, "Cytoskeleton structure, pattern of mitochondrial activity and ultrastructure of frozen or vitrified sheep embryos," *Cryobiology*, vol. 67, pp. 137–145, 2013.
- [25] I. Roato, D. Alotto, D. C. Belisario et al., "Adipose derived mesenchymal stem cells viability and differentiating features for orthopaedic reparative applications: banking of adipose tissue," *Stem Cells International*, vol. 2016, Article ID 4968724, 11 pages, 2016.
- [26] B. C. Bellagamba, B. R. R. d. Abreu, I. Grivicich et al., "Human mesenchymal stem cells are resistant to cytotoxic and genotoxic effects of cisplatin in vitro," *Genetics and Molecular Biology*, vol. 39, pp. 129–134, 2016.
- [27] C. Death and S. Cells, "Role of the apoptosis pathway in cryopreservation-induced from umbilical cord blood," *Biopreservation and Biobanking*, vol. 12, pp. 246–254, 2014.