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Dendrobium: Vital Element for Immunomodulatory Activities

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Abstract

Dendrobiums are tropical orchids, requiring warm, humid and shady conditions. This is the second largest genus of the orchid family with more than 1000 species. The *Dendrobium* plant is unusual in appearance, being sympodial, epiphytic, and bulbless, which is a name they are worthy of, the name coming from Greek origin: “dendros”, tree, and “bios”, life. *Dendrobium* species have been used for a thousand years as first-rate herbs in traditional medicines. They are source of tonic, astringent, analgesic, antipyretic, and anti-inflammatory substances, and have been traditionally used as medicinal herbs in the treatment of a variety of disorders, such as, nourishing the stomach, enhancing production of body fluids or nourishing.

Introduction

The plant member of orchid is native of china, India, Hong Kong Thailand Vietnam other temperate and tropical Asian region with stand for largest orchid genus after bulbophyllum in Asia Europe and Australia. Traditionally it is used in Chinese medicines; it is taken as pre workout supplements as it boosts up physical and athletic performance. This is also effective in reduce blood pressure, increase circulation sugar and reduce pain (Veronika *et al.*, 2017).

Merits of Dendrobium Spices for treating ages pathologies in humans

Physical Performance: Chinese consider Dendrobium as one of the fifty fundamental herbs used to treat all kinds of ailments and use Dendrobium tonic for longevity. Indeed, a large number of pharmacological activities were assigned to different Dendrobium species, such as anti-inflammatory, anti-platelet aggregation, hepatoprotective, anti-fibrotic, anti-viral, anti-fungal, antimicrobial, antioxidant, anti-diabetic, neuroprotective, immune-modulatory and anticancer.

Even some studies have showed that it's also helpful in healing of Dry mouth, Cough, Fever, Heat stock, Thirst, boosting immune function, Vomiting, Abdominal pain, Tuberculosis, Anoxia.

Dendrobium mainly known for the properties: As it includes properties like tonic astringent analgesic antipyretic & anti-inflammatory use as medicinal herb in curing variety of disorders like nourishing the stomach enhancing production of body fluid.

Dendrobium plays a major role in treating age related pathologies: Different sps. of dendrobium involve in various other activities such as anti-plantlet aggregation hepatoprotective anti-fibrotic anti-viral anti-fungal anti-oxidant anti-diabetic neuro-protective anti-cancer.

Dendrobium spice i.e., *Dendrobium moniliforme* also known

as orchid that give long life to men.

How Dendrobium is Used to Treat Some Important Disease?

Anti-Cancerous Effect

Dendrobium species are found to be valuable natural source of promising anti-cancerous agent it inhibits cell proliferation and induce apoptosis of tumor cell. In chemotherapy it may be used as adjuvant drug. Its extract has various characteristics such that which slow growth and lower natural propagation rate so it is also known by “gold of herb” after various studies it is found that it is having various inhibitory effect which slows down the tumor growth of cancer cells (Lam et al., 2015).

Anti-Diabetic

Diabetic is a metabolic disease with abnormally high level of blood glucose which is caused due to deficiency of insulin. In various studies it has been evaluated that

impact of dendrobium mixture correct impaired glucose tolerance and improve insulin resistance. It is natural hypoglycemic agent. The drug commonly used to treat type 2 diabetic (in which gene expression get changed) in which D. mix regulates the insulin signaling pathway to inhibits gluconeogenesis and improve sugar concentration (Veronika et al., 2017).

Neuroprotective

It is large term which involves the preservation of neuronal including structure or function various neural disorders, including brain ischemia, Parkinson’s disease is commonly seen in a wide range of population when *D. nobile* is use to treated it increase Cell viability, decrease Cell apoptosis and Cell morphological impairment like programmed cell death or necrotic cell death. *D. nobile* alkaloids have protective effect averse to neuronal damage and neuro-inflammation as potential mechanism.

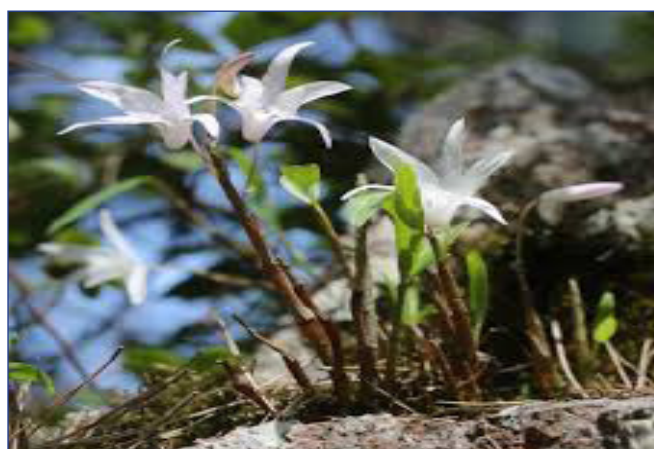


Figure 1: a) *Dendrobium moniliforme*



Figure 1: b) *Dendrobium nobile*

Table 1: *Dendrobium* spp. and their constituents with anticancer properties (Veronika et al., 2017)

Dendrobium Species	Active molecule present	Target Area	Performance
<i>Dendrobium. brymerianum</i> (Edible part-whole Plant)	Methanolic extract Moscatilin, Gigantol Lusianthridin, Dendroflorin	Targeted on Human Lung cancer cells.	Toxic to cancerous cells,
<i>Dendrobium. Candidum</i> (Edible part-whole Plant)	Methanolic extract	Targeted on Human colon carcinoma cell line HCT-116, BALB/c mice bearing 26-M3.1 colon carcinoma cells Azoxymethane (AOM) gene mutant agent- and dextran sulfate sodium-induced colon carcinogenesis in C57BL/6 mice BALB/c mice bearing 26-M3.1 cells, Breast cancer cell line MCF-7	Toxic to cancerous cells, Cancer inhibitory quality, Anti-metastatic Stop growth of uncontrolled cell growth, induction of cell cycle arrest at G2/M phase

Dendrobium Species	Active molecule present	Target Area	Performance
<i>Dendrobium. catenatum</i> (Edible part-whole Plant)	Protein extract Peptides	Targeted on Human liver cancer cell line HepG2, human gastric cancer cell line SGC-7901 and breast cancer cell line MCF-7	Toxic to cancerous cells, Cancer inhibitory quality, (Anti-metastatic) Stop growth of uncontrolled cell growth.
<i>Dendrobium. chrysotoxum</i> (Edible part- Not specified)	Erianin (a natural bibenzyl compound)	Attached on Human mammary gland T47D cells, Human osteosarcoma cells 143B and Saos2, BALB/c-nu mice orthotopically inoculated with 143B cells	antiforeign, Stop growth of uncontrolled cell growth., induction of apoptosis and cell cycle arrest, Induction of G2/M-phase arrest, apoptosis and autophagy.
<i>Dendrobium. moniloforme</i> (Edible part stems)	Denbinobin Moniliformediquinone (MFD)	Killed on Leukemic cells present in blood, Human hormone refractory prostate cancer cells PC-3 and DU-145	NF-κB nuclear factor inhibition and apoptosis via ROS generation Glutathione involved mitochondria stress and DNA damage
<i>Dendrobium. nobile</i> (Edible Parts- stems)	Denbinobin (5-hydroxy-3,7-dimethoxy-1,4-phenanthraquinone)	Human hepatic adenocarcinoma cells (cancer of mucus-producing glandular cells) SK-Hep-1, human gastric cell line	Toxic to cancerous cells, Cancer inhibitory quality anti-tumor and anti-inflammatory.

Table 2: *Dendrobium* spp. and their constituents with Neuroprotective properties (Veronika *et al.*, 2017)

Dendrobium Species	Active molecule present	Target Area	Performance
<i>Dendrobium. auranti-cum var. denneanum</i> (Edible Part- stems)	4-hydroxy-3,3',5,5'-tetramethoxy-8,4'-oxyneolign-7'-ene-7,9,9'-triol 7,9'-bis-O-β -D-glucopyranoside (-)-syringaresionl-4,4'-bis-O-β -D-glucopyranoside	Targeted on PC12 cells line derived from a pheochromcytoma of the adrenal medulla of rat (embryonic origin from the neural crest that has a mixture of neuroblastic cells)	Neuroprotective activity against glutamate-induced toxicity (neuronal and glial cell death) cytotoxic activity against 11 kinds of human tumor cells.
<i>Dendrobium. nobile</i> (Edible Parts- stems)	Alkaloids (DNLA) or Metformin	Primary culture of rat cortical neurons (in vitro) Rat's hippocampus Tau protein in rat's hippocampus A β25-35-induced spatial learning and memory impairments in mice	diminishing of neuronal damage on cortical neurons injured by oxygen-glucose deprivation/reperfusion Inhibition of LPS-induced memory impairment Inhibition of hyper phosphorylation (V signaling mechanisms used by the cell to regulate mitosis.) and LPS-induced apoptosis. Prevention of A β25-35-induced neuronal and synaptic loss.
<i>Dendrobium. crepidatum</i> (Edible Part- stems)	Crepidatol A, Confusarin, 3-(2-acetoxy-5-methoxy)-phenylpropanol	PC12 cells line	Enhancing activity on NGF (Nerve growth factor) -induced neurite outgrowth (developing neurons produce)

Dendrobium Species	Active molecule present	Target Area	Performance
<i>Dendrobium chrysotoxum</i> (Edible Part- stems)	Chrisoto bibenzyl Erianin (a natural bibenzyl compound) Chrysotoxine (novel bibenzyl compound) Chrysotoxine	Acetylcholinesterase (AChE) and butyrylcholinesterase (BChE), Bone marrow neuro-blastoma cells SH-SY5Y	Inhibits 6-hydroxydopamine induced apoptosis in SH-SY5Y cells via mitochondria protection and NF-κB modulation. Enzymatic inhibition Attenuation of 6-OHDA toxicity cells via mitochondria protection and NF-κB modulation Inhibition of the neurotoxicity of 1-methyl-4-phenyl pyridinium (MPP+).

Table 3: *Dendrobium* spp. and their constituents with antidiabetic properties (Veronika et al., 2017)

Dendrobium Species	Active molecule present	Target Area	Performance
<i>Dendrobium chrysotoxum</i> (Edible parts-stems)	Ethanollic extract Erianin Polysaccharide	Diabetic retinopathy (damage to the blood vessels of the light-sensitive tissue at the back of the eye (retina) Alloxan-induced diabetic mice (classical diabetogenic chemical) (destruction of β-cells and type 1 diabetes)	Amelioration of retinal angiogenesis Preventing retinal inflammation and tight junction protein decrease Inhibition of high-glucose-induced retinal angiogenesis Inhibition of the increase in blood sugar level
<i>Dendrobium devonianum</i> (Edible Parts- whole plant)	5-hydroxy-3-methoxy-flavone-7-O-(β-D- apiosyl-(1-6))- β -D-glucoside Gigantol	β -glucosidase in vitro	Enzymatic inhibition
<i>Dendrobium huoshanense</i> (stems)	Polysaccharides	Alloxan-induced diabetic mice Protein glycation in vitro	Hypoglycemic Anti-glycation activity
<i>Dendrobium loddigesii</i> (stems)	Loddigessinol G-J Crepidatuol B	β -glucosidase in vitro	Enzymatic inhibition
<i>Dendrobium nobile</i> (stems)	Polysaccharides	Alloxan-induced diabetic mice	Hypoglycemic
<i>Dendrobium officinale</i> (stems)	Polysaccharides Mixture with other TCM herbs Fresh juice Aqueous extracts (after pre-extraction with petroleum ether and 80% ethanol)	Alloxan-induced diabetic mice (classical diabetogenic chemical) (destruction of β-cells and type 1 diabetes) Genome STZ-induced mice (targets insulin-producing beta cells in the pancreas)	Hypoglycemic Gene expression of mechanisms involved in type 2 diabetes Cardio protective potential against diabetic cardiomyopathy STZ-induced diabetic complications, reduction of hypoalgesia and histopathological changes of vital organs induced by hyperglycemia

Dosing

It depends on users age health and other condition always keep a think in mind that a natural product is not always necessarily safe and doses have very important role only follow the direction on the product label and by consulting your pharmacists or physician.

- *Dendrobium nobile* – also known as the Royal Dendrobium it is one of the fifty mostly used herb traditional Chinese medicines.
- This product is often seen used by body builder.
- In many different sports *Dendrobium nobile* extract are used.
- It can be harvested throughout the year especially in spring.

It can be grown on tree and even on rocks.

- It requires cool nights to start blossoming.

Extraction

Extraction take place in pure ethanol through stem of it, the active substance drawn out of the plant material, afterward ethanol gets evaporated further which result in stronger extract. You will be amazed after knowing that its extraction is not legal is Netherlands.

Medicinal Uses

- Substance which extracts from *D. nobile* has anti cancerous properties.
- It has been used in blood diabetic health problems.
- Use in nerves related issue i.e., in neuroprotection including neurodegenerative diseases, brain ischemia, neurotoxin consumption and traumatic brain injury.

Effect

After ingestion it takes half to 1 hour to show its effects and that is very positive. People experience more energy after consumption. It is also found that some people become hyperactive after consuming one cup of coffee but it does not seem/ feel by the people with drink more than ten cups/day. After consuming *Dendrobium's* potency last for about 4 hours.

Contradiction

As it is recreational drug therefore the combination of it with other substance. Side effect of *Dendrobium* is not yet reported but be aware; do not combine with alcohol or other stimulant.

- Do not consume this product during pregnancy or while breastfeeding.
- Only take after the prescription by physician only to avoid other risk.

Conclusion

In this article, we have tried to enlist the main research on *Dendrobium* species and their most active constituents. Searching for anticancer properties of *Dendrobium* plants, various targets and mechanisms have been explored. Several species of *Dendrobium* exerted neuroprotective activities, but their evaluation on modern targets should be undertaken in the future.

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