



Review Article

A REVIEW ON PHYTOCHEMICAL AND PHARMACOLOGICAL POTENTIAL OF FAMILY ORCHIDACEAE

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ABSTRACT

Orchidaceae family has huge therapeutic potential. Orchid plants are utilised as therapeutics since ancient times. Various plants of Orchidaceae are used as Antimicrobial, Anti inflammatory, Antioxidant, Anticancer, Antipyretic, Antimutagenic, Anticonvulsive, Antihelminthic, Antihepatotoxic, Wound healing, Anti platelet, Antidiabetic, Antiallergic, Immunomodulatory, Anti aging, Pain relieving, Antiviral, Herbicidal agent etc. this activity is due to various constituents present in these plants. These are mainly Alkaloids derived from aromatic amino acids, Stilbenoids mainly Bibenzyl and Pheanthrenes, Flavonoids, Triterpenoids and steroids, Essential oils, Glycosides, Xanthones, Coumarins etc. important Genus showing therapeutic potential are Bletilla, Bulbophyllum, Coelogyne, Cremastra, dendrobium, Eria, Pholidota. Currently data on phytoconstituents and pharmacological activity have been scientifically confirmed. These plants illustrate excellent potential for further scientific studies leading to identification of leads which may result in discovery of novel compounds of therapeutic interest. We have presented important phytoconstituents along with Molecular Formula, 2D structure and Pub Chem ID to ease the next scientific work.

KEYWORDS: Medicinal orchids, Pharmacological activity, Phytochemicals, Orchidaceae

INTRODUCTION

Orchids (family Orchidaceae) are plants with beauty and utility. These are consumed as nutraceuticals since ancient times. Their therapeutic potential had been realised since ages. The Chinese were the first to grow and to explore them as medicinal plants. Theophrastus reported the curative properties of Orchids. De Materia Medica of Dioscorides also featured two terrestrial orchid species. Ashtavarga (group of eight herbs) is an important component of Ayurvedic formulations, out of these herbs, four are orchids. These are *Habenaria edgeworthii*, *Habenaria intermedia*, *Malaxis acuminata*, *Malaxis muscifera*. In addition to these, other orchids like *Dactylorhiza hatagirea* (Salam panja), *Dendrobium macrei* (Swarna Jivanti), *Eulophia dabia* (Salam misari), *Eulophia nuda* (Amarkanda), *Vanda tassellata* (Rasna), *Saccolabium papillosum* (Rasna substitute) are also much-admired for their astonishing therapeutic potential.¹ There have been a number of reports of their remedial properties. These are attributed to the presence of certain phytochemicals known as secondary metabolites. This is the right time to be acquainted with the therapeutic potential of the orchids. Consequently compiled

data is required for phytochemical and pharmacological potential of Orchidaceae family.²

Available literature was reviewed from Science Direct, PubMed and Google Scholar using combinations of the following keywords: phytochemistry, pharmacology, Orchid, Orchidaceae.

Potential of the family for Medicinal Uses

Orchidaceae family has huge potential for novel drugs. As compared to other families of plant kingdom little work has been done to explore the potential of this family for medicinal purposes. Here attempt has been made to gather the data of this family from various sources so that its potential can be navigated by future scientists. In Figure 1 some medicinal plants have been shown in their natural habitat whereas in Table 1 important phytoconstituents are enlisted along with their Pub Chem CID, 2D Structure and class of compounds. These compounds can be a lead for different pharmacological activities and can be boon for human society. Details of some of the plants are mentioned below:



Figure 1: Vridhi (*Habenaria edgeworthii*)
(Used as emollient, rejuvenating, aphrodisiac, Curative for cough, fever, insanity, epilepsy, general debility)



Figure 2: Salam Panja (*Dactylorhiza hatagirea*)
(Used as tonic and aphrodisiac. Curative for diarrhoea, dysentery, chronic fevers, general weakness)



Figure 3: Swarna Jivanti (*Dendrobium macrei* Lindl.)
(Used as astringent, aphrodisiac and expectorant. Curative for throat troubles, tuberculosis, asthma)



Figure 4: Rishbhak (*Malaxis muscifera*)
(Used as tonic and aphrodisiac. Curative for seminal weakness, dysentery, emaciation, general debility)



Figure 5: Ridhi (*Habenaria intermedia* D. Don)
(Used as aphrodisiac, rejuvenating & tonic, Curative for epilepsy, cough, skin diseases, cardiac disorders, general debility)

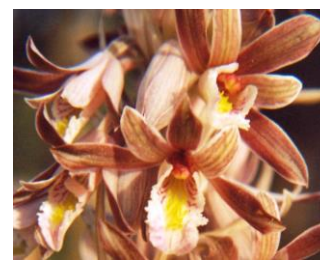


Figure 6: Salam misari (*Eulophia dabia* (D. Don) Hochr.)
(Used as tonic and aphrodisiac Curative for stomatitis, cough, heart diseases)

Some Therapeutic Plants of the Family

Agrostophyllum callosum.³

Phytochemistry: Mainly Stilbenoids are present. Compounds reported are (1) Callosumin, (2) callosuminin (3) callosumidin (4) 4-hydroxy-3,5-dimethoxybenzoic acid (5) orchinol (6) 6-methoxycoelonin (7) imbricatin (8) flaccidin (9) oxoflaccidin (10) isooxoflaccidin (11) flaccidin (12) agrostophyllin (13) callosin (14) callosinin.

Agrostophyllum khasianum.⁴

Phytochemistry: in this species also Stilbenoids are mainly reported. Compounds are (1) Agrostophyllin (2) imbricatin (3) flaccidin (4) isoflaccidin (5) moscatilin (6) agrostophyllone (7) agrostophylloxin (8) agrostophylloxidin (9) agrostophyllidin

Anoectochilus formosanus.^{5,6}

Pharmacology: Cytotoxicity and immunomodulatory studies have been reported.

*Ansellia Africana*⁷

Pharmacology: It is used in the treatment of Alzheimer's disease.

*Appendicula reflexa*⁸

Phytochemistry: Phenanthrenes are reported. These are (1) 3,4,6,7-tetramethoxyphenanthrene-2,8-diol (2) blestrin E (3) nudol (4) coelonin (5) 6-methoxycoelonin .
Pharmacology: cytotoxic activities reported.

*Arundina graminifolia*⁹

Phytochemistry: Phenanthrene reported are (1) 7-hydroxy-2, 4-dimethoxy-9, 10-dihydrophenanthrene (2) 4, 7-dihydroxy-2-methoxy-9, 10-dihydrophenanthrene (3) 2, 7-dihydroxy-4-methoxy-9, 10-dihydrophenanthrene (4) 7-hydroxy-2-methoxyphenanthrene-1,4-dione (5) 7-hydroxy-2-methoxy-9, 10-dihydrophenanthrene-1,4-dione.

*Bletilla formosana*¹⁰

Phytochemistry: dihydrophenanthrenes reported. These are (1) 4-methoxy-9,10-dihydrophenanthrene-1,2,7-triol (2) 1-(4-hydroxybenzyl)-4,7-dimethoxy-9,10-dihydrophenanthrene-2-ol, (3) 1,3,6-tri(4-hydroxybenzyl)-4-methoxydihydrophenanthrene-2,7-diol. phenanthrene derivatives, flavonoids, bibenzyl and phenolic compounds have also been listed.

*Bletilla striata*¹¹⁻¹⁴

Phytochemistry: polysaccharides, bibenzyls, phenanthrenes, triterpenoids, saponins, steroids are reported. blespirol and acylated anthocyanins have also been investigated out in this plant.

Pharmacology: It is used for the treatment of blood disorders, tuberculosis, ulcers, anthrax, eye diseases, silicosis, wound healing. Cytotoxicity, antimicrobial, anti-inflammation, anti-oxidation, immunomodulation, anti-fibrosis, anti-aging, anti-allergy, and anti-itching activities have been reported in this plant.

*Bulbophyllum gymnopus*¹⁵

Phytochemistry: Gymnopusin is isolated.

*Bulbophyllum kaitense*¹⁶

Pharmacology: Antimicrobial activity.

*Bulbophyllum kwangtungense*¹⁷

Phytochemistry: Desnsiflporal reported
Pharmacology: desnsiflporal exhibit antitumour activities.

*Bulbophyllum leopardium*¹⁸

Phytochemistry: Bulbophyllanthrin isolated.

*Bulbophyllum odoratissimum*¹⁹⁻²¹

Phytochemistry: Phenanthraquinone, bulbophyllanthrone and dimeric phenanthrenes, bulbophythrins A & B are reported. other compounds are moscatin (1), 7-hydroxy-2,3,4-trimethoxy-9,10-

dihydrophenanthrene (2), coelonin (3), densiflorol B (4), gigantol (5), batatasin III (6), tristin (7), vanillic acid (8) and syringaldehyde (9).

Pharmacology: In vitro inhibitory ability against the growth of human leukemia cell lines have been described.

Bulbophyllum sterile²²

Pharmacology: Antitumor activity has been reported.

Bulbophyllum vaginatum²³

Phytochemistry: Phenanthrenes have been reported.

Coelogyne ovalis²⁴

Phytochemistry: Bibenzyl are reported is 3'-O-methylbatatasin 111.

Coelogyne cristata²⁵

Phytochemistry: Coelogin, Coeloginin, coeloginanthridin and coeloginanthrin are reported.

Pharmacology: phytoalexins and endogenous plant growth regulators activities reported.

Coelogyne flaccida²⁶

Phytochemistry: Flaccidin (9,10-dihydrophenanthropyran derivative) reported.

Cirrhopetalurn andersonii²⁷

Phytochemistry: Cirrhopetalin (a phenolic) has been isolated.

Cremastra appendiculata²⁸⁻²⁹

Phytochemistry: Phenanthrene, bibenzyls have been reported.

Pharmacology: cytotoxic activity reported.

Cymbidium goeringii³⁰

Phytochemistry: Gigantol

Pharmacology: Anti-inflammatory activity reported.

Cymbidium pendulum³¹

Phytochemistry: phenanthrene reported.

Cyrtopodium cardiochilum³²

Phytochemistry: A polysaccharide reported.

Pharmacology: phagocytosis stimulating activity reported.

Cyrtopodium paniculatum³³

Phytochemistry: stilbenoids reported. These are cyrtopodinone (1), cyrtopodinol (2), (3) coeludol A (4) coeludol B

Pharmacology: human glioblastoma U-87MG cytotoxicity activity reported

Dactylorhiza chuhensis Renz&Taub³⁴

Pharmacology: Anticancer activity reported.

Diaphanathe bidens³⁵

Pharmacology: Antidiabetic activity reported.

Dendrobium 'Pramot' (phalaenop- sis type cv)³⁶

Phytochemistry: anthocyanin reported.

Dendrobium cariniferum³⁷

Phytochemistry: bibenzyls, phenanthrenes reported.

Pharmacology: Antitumour, antioxidant and antimutagenic activities reported.

Dendrobium densiflorum³⁸

Phytochemistry: phenanthredione isolated.

Pharmacology: anti-platelet aggregation activity documented.

Dendrobium huoshanense³⁹⁻⁴⁰

Phytochemistry: The water-soluble polysaccharide HPS reported.

Pharmacology: The immunomodulating responses in intestine, spleen and liver evaluated.

Dendrobium Moniliforme⁴¹

Phytochemistry: dihydrophenanthrene bibenzyl and sterols reported.

Eria bambusifolia⁴²

Phytochemistry: Erathrins A and B are reported.

Compound erathrins A represented a novel carbon framework having a phenanthrene-phenylpropane unit with a dioxane moiety.

Pharmacology: cytotoxicity activity studied.

Eria Confusa⁴³

Phytochemistry: phenanthrene derivatives reported.

Eria convallarioides⁴⁴

Phytochemistry: Nudol, erianthridin, sitosterol and erianol, reported.

Eria Flava⁴⁵

Phytochemistry: Flavanthrin, dimeric 9,10-dihydrophenanthrene derivative reported .9,10-dihydrophenanthrene coelonin are also documented.

Eria stricta⁴⁶

Phytochemistry: Phenanthrenes including 9,10-dihydrophenanthropyran have been reported.

Eulophia macrobulbon⁴⁷

Pharmacology: anti-inflammatory, antioxidant and cytotoxic activity reported.

Eulophia nuda⁴⁸

Pharmacology: cytotoxic activity.

Gastrodia Elata⁴⁹⁻⁵¹

Phytochemistry: Noda *et al* 1995 isolated benzyl derivative, 2,5-bis(4-hydroxybenzyl) Zhan *et al* 2016 reported Gastrodin, Hydroxybenzyl alcohol,4-hydroxybenzaldehyde, Vanillyl alcohol, Vanillin, Parishin, Parishin B, Parishin C,β-sitosterol, Gastrodamine phenol reported

Pharmacology: Ahn *et al*, 2007 demonstrated anti-angiogenic, anti-inflammatory and analgesic activities. Matias *et al* 2016 studied anticonvulsant potential. Zhan *et al* 2016 reported this plant as sedative, hypnotic, antiepileptic, anticonvulsive, antianxiotic, antidepressant, neuroprotective, antipsychotic, anti-vertigo, anti-inflammatory, analgesic, antioxidative, antiaging, antiviral and antitumor effects.

Habenaria repens⁵²

Phytochemistry: habenariol isolated.

Pharmacology: Antioxidant activity reported.

Laelia autumnalis⁵³

Pharmacology: vasorelaxant action and antihypertensive activity studied.

Maxillaria Densa⁵⁴

Phytochemistry: phenanthrene derivatives isolated.

Pharmacology: bioherbicide activity reported.

Monomeria barbata Lindl.⁵⁵

Phytochemistry: biphenanthrene compounds, triphenanthrene compound have been isolated.

Pharmacology: cytotoxic activity against various carcinoma and the antioxidant activity in DPPH radical scavenging have been studied.

Oncidium baueri⁵⁶

Phytochemistry: Glycosylated flavanones are isolated

Pharmacology: Antitrypanosomal, antileishmanial activities and cytotoxicity activities were assessed.

Oncidium flexuosum Sims.⁵⁷

Pharmacology: wound healing activity of hydroalcoholic leaf extract were evaluated.

Phalaenopsis equestris⁵⁸

Phytochemistry: phenanthropyran derivatives reported.

Pholidota cantonensis⁵⁹

Phytochemistry: Two 9,10-dihydrophenanthrenes trivially named phocantol and phocantone, two diterpenoid glycosides named phocantoside A and phocantoside B are reported.

Pharmacology: Anti-cancer activity reported.

Phragmipedium calurum⁶⁰

Phytochemistry: stilbenes and one alkylresorcinol were isolated

Pharmacology: antiproliferative activity reported.

Pholidota chinensis⁶¹⁻⁶²

Phytochemistry: stilbene derivatives reported.

Pharmacology: Antioxidant activity reported.

Pholidota yunnanensis⁶³⁻⁶⁵

Phytochemistry: Stilbenoids reported

Pharmacology: Antioxidant activity reported.

Pleione bulbocodioides⁶⁶⁻⁶⁷

Stilbenoids and phenanthrofurans reported.

Pleione yunnanensis⁶⁸

Phytochemistry: Three dihydrophenanthrofurans, pleionesins A–C are reported in this plant

Prosthechea karwinskii⁶⁹

Pharmacology: It is used in coughs, wounds, burns, diabetes, to prevent miscarriages and to assist in childbirth.

Spiranthes sinensis⁷⁰

Phytochemistry: Homocyclotirucallane, sinetirucalol and two dihydrophenanthrenes, sinensol G and sinensol H were isolated from the aerial parts

Thunia alba⁷¹

Phytochemistry: Stilbenoids reported.

Vanda coerulea⁷²

Phytochemistry: stilbenoids have been reported

Pharmacology: DPPH/NOH radical scavenging activities reported.

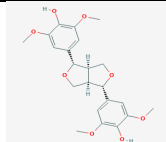
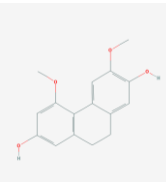
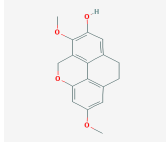
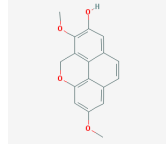
Vanda roxburghii⁷³

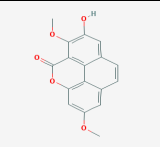
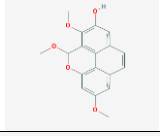
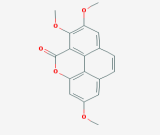
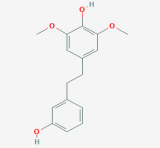
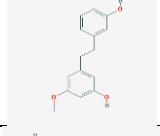
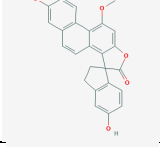
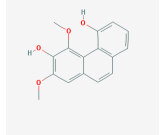
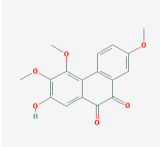
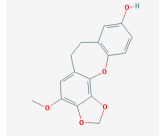
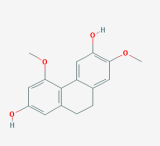
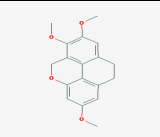
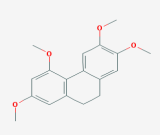
Pharmacology: Different extracts showed the cholinesterase inhibitory activities and antioxidant properties.

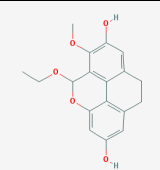
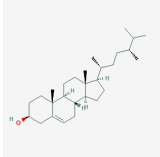
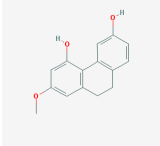
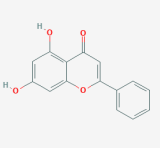
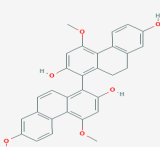
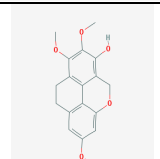
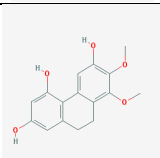
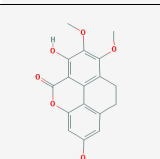
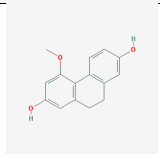
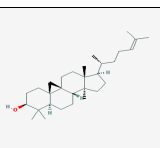
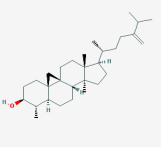
Vanilla planifolia⁷⁴

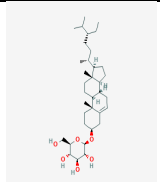
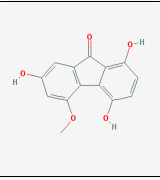
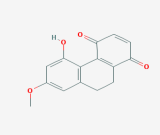
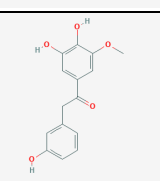
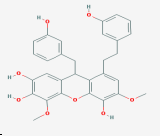
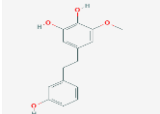
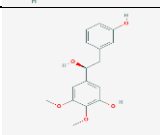
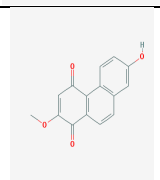
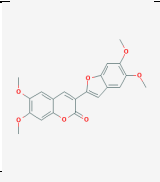
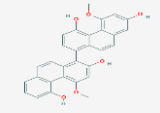
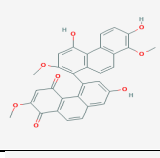

Phytochemistry: The metabolomic analysis of glucosides A and B done collected during different seasons were done in this plant.

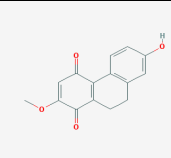
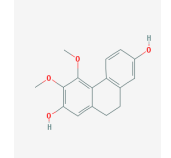
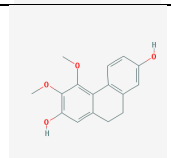
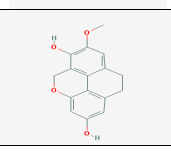
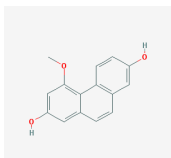
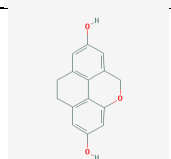
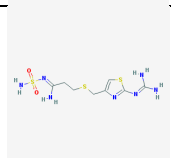
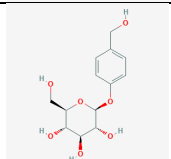
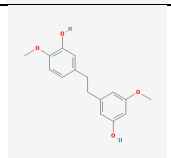
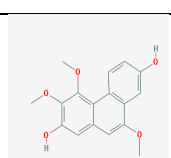
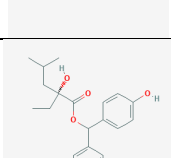
Table 1. Important phytoconstituents reported in Orchidaceae family along with their structure, Pub Chem CID Class and Molecular Formula

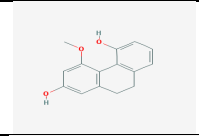
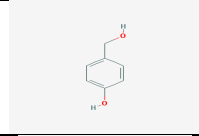
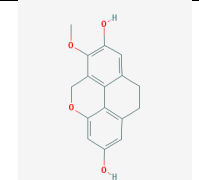
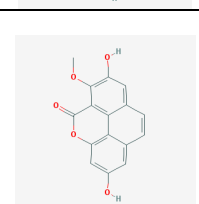
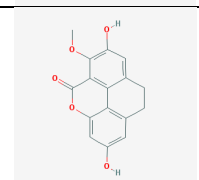
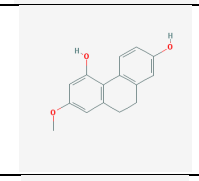
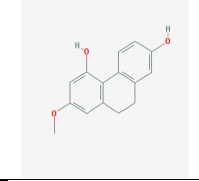
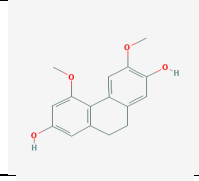
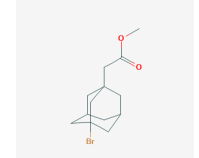
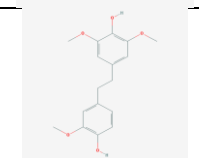
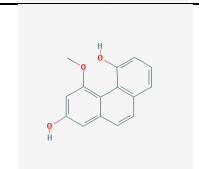
Sl. No.	Name of Compound	Molecular Formula	Pub Chem CID	Structure 2D	Name of Plant	Ref	Phytochemical class
1.	(+)-Syringaresinol	C ₂₂ H ₂₆ O ₈	443023		<i>Dendrobium Moniliforme</i>	[41]	furofuran lignin
2.	6-methoxycoelonin	C ₁₆ H ₁₆ O ₄	45267920		<i>Agrostophyllum callosum</i>	[3]	Stilbenoid
					<i>Appendicula reflexa</i>	[8]	
3.	Agrostophyllidin 7-hydroxy- 2,6-dimethoxy-9,10-dihydro-5H-phenanthro[4,5-bcd]pyran	C ₁₇ H ₁₆ O ₄			<i>Agrostophyllum khasiyanum</i>	[4]	Phenanthropyran
4.	Agrostophyllin	C ₁₇ H ₁₄ O ₄	442693		<i>Agrostophyllum khasiyanum</i>	[4]	Phenanthropyran
					<i>Agrostophyllum callosum</i>	[3]	

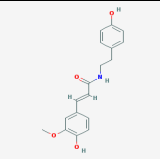
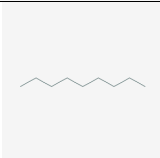
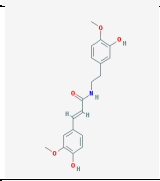
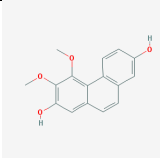
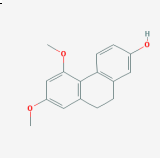
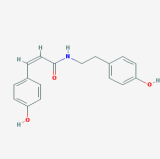
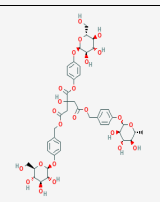
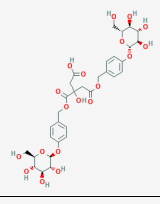
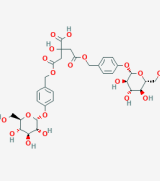
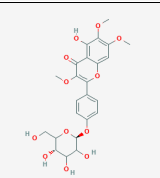
5.	Agrostophyllone 7-hydroxy-2,6-dimethoxy-5H-phenanthro[4,5-bcd]pyran-5-one	C ₁₇ H ₁₂ O ₅	101992972		<i>Agrostophyllum khasianum</i>	[4]	Stilbenoid
6.	Agrostophylloxidin 7-hydroxy- 2,5,6-trimethoxy-5h-phenanthro[4,5 -bcd]pyran	C ₁₈ H ₁₆ O ₅	101992973		<i>Agrostophyllum khasianum</i>	[4]	Stilbenoid
7.	Agrostophylloxin, 2,6,7-trimethoxy-5h-phenanthro[4,5 -bcd]pyran-5- one	C ₁₈ H ₁₄ O ₅	14890495		<i>Agrostophyllum khasianum</i>	[4]	Stilbenoid
8.	Aloifol I	C ₁₆ H ₁₈ O ₄	86150014		<i>Dendrobium Moniliforme</i>	[41]	Bibenzyll
9.	Batatasin III	C ₁₅ H ₁₆ O ₃	10466989		<i>Bulbophyllum odoratissimum</i>	[37]	Phenol
10.	Blespirol	C ₂₅ H ₁₈ O ₅	102440970		<i>Bletilla striata</i>	[12]	Phenanthrenes
11.	Bulbophyllanthrin,	C ₁₆ H ₁₄ O ₄	44445443		<i>Bulbophyllum leopardium</i>	[18]	Phenanthrenes
12.	Bulbophyllanthrone	C ₁₇ H ₁₄ O ₆	398641		<i>Bulbophyllum odoratissimum</i>	[19]	Phenanthrenes
13.	Bulbophylol B	C ₁₆ H ₁₄ O ₅	11818504		<i>Pholidota chinensis</i>	[61]	benzoxepin derivative
14.	Callosin 4,7-dimethoxy-9,10-dihydrophenanthrene-2,6-diol	C ₁₆ H ₁₆ O ₄	86182261		<i>Agrostophyllum callosum</i>	[3]	Stilbenoid
15.	Callosinin	C ₁₈ H ₁₈ O ₄	14235433		<i>Agrostophyllum callosum</i>	[3].	Stilbenoid
16.	Callosumin	C ₁₈ H ₂₀ O ₄	26195381		<i>Agrostophyllum callosum</i>	[3]	Stilbenoid

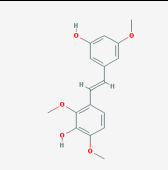
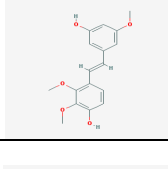
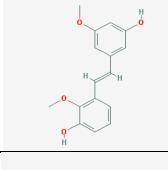
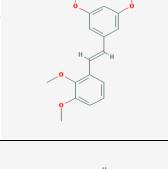
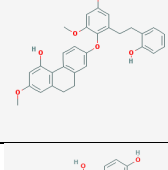
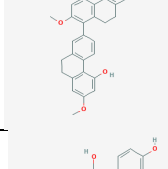
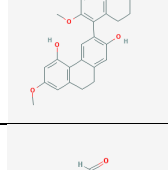
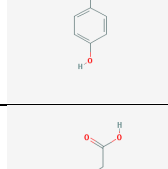
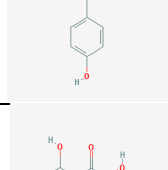
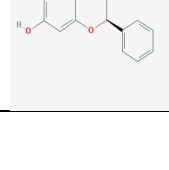
17.	Callosumindin	C ₁₈ H ₁₈ O ₅	101995816		<i>Agrostophyllum callosum</i>	[3]	Stilbenoid
18.	Campesterol,	C ₂₈ H ₄₈ O	173183		<i>Arundina and Cattle ya</i>	[75]	Glycoside
19.	Cannabidihydrophenanthrene	C ₁₅ H ₁₄ O ₃	53438738		<i>Pholidota chinensis</i>	[61]	dihydrophenanthrene
20.	Chrysin	C ₁₅ H ₁₄ O ₄	5281607		<i>Bulbophyllum odoratissimum</i>	[19]	Flavonoids
21.	Cirrhopetalanthrin (Blestriarene B)	C ₃₀ H ₂₄ O ₆	442695		<i>Cremastra appendiculata Thunia alba</i>	[29] [71]	Stilbenoid
22.	Coelogin	C ₁₇ H ₁₆ O ₅	442697		<i>Coelogyne cristata</i>	[25]	Phrenathrenoid
23.	Coeloginanthridin (3,5,7-trihydroxy-1,2-dimethoxy-9,10-dihydrophenanthrene)	C ₁₆ H ₁₆ O ₅	636881		<i>Coelogyne cristata</i>	[25]	9,10-dihydrophenanthrene
24.	Coeloginin	C ₁₇ H ₁₄ O ₆	14427337		<i>Coelogyne cristata</i>	[25]	Phrenathrenoid
25.	Coelonin	C ₁₅ H ₁₄ O ₃	11390848		<i>Appendicula reflexa , Bulbophyllum odoratissimum, Pholidota chinensis , Vanda coerulea</i>	[8] [21] [61] [72]	monomeric phenanthrenes
26.	Cycloartenol	C ₃₀ H ₅₀ O	92110		<i>Arundina and Cattleya</i>	[75]	Triterpenoid
27.	Cycloeucalenol,	C ₃₀ H ₅₀ O	101690		<i>Arundina and Cattleya</i>	[75]	Triterpenoid

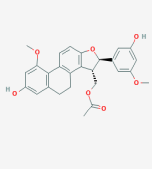
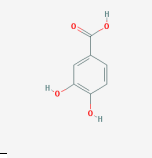
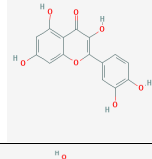
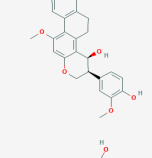
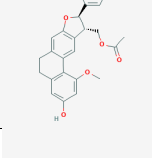
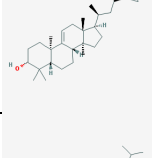
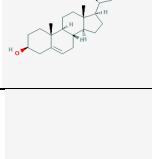
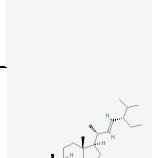
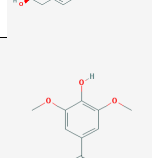
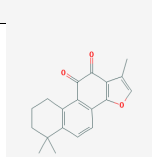

28.	Daucosterol	C ₃₅ H ₆₀ O ₆	5742590		<i>Dendrobium Moniliforme</i>	[41]	Sterol
29.	Dendroflorin	C ₁₄ H ₁₀ O ₅	44418788		<i>Dendrobium densiflorum</i>	[38]	Polyphenol
30.	Dendronone 5-hydroxy-7-methoxy- 9,10-dihydro-1,4- phenanthrenequinone	C ₁₅ H ₁₂ O ₄	91493051		<i>Dendrobium cariniferum</i>	[21]	Phenanthrenequinone
31.	Dendrosinen C	C ₁₅ H ₁₄ O ₅	102138541		<i>Dendrobium sinense</i>	[76]	Bibenzyl
32.	Dendrosinen D	C ₃₀ H ₂₈ O ₈	102138542		<i>Dendrobium sinense</i>	[76]	Bibenzyl
33.	Dendrosinene B	C ₁₅ H ₁₆ O ₄	102138540		<i>Dendrobium sinense</i>	[76]	Bibenzyl
34.	Dendrosinens A	C ₁₆ H ₁₈ O ₅	102138539		<i>Dendrobium sinense</i>	76	Bibenzyl
35.	Densiflorol B	C ₁₅ H ₁₀ O ₄	637413		<i>Bulbophyllum odoratissimum</i>	[21]	Phenolic/ Phenethrene dione
36.	Denthyrsin [3-(50,60- dimethoxybenzofuran- 20-yl)-6,7-dimethoxy- 2h-chromen-2-one]	C ₂₁ H ₁₈ O ₇	11291989		<i>Dendrobium thyrifloru s</i>	[77]	Coumarin- benzofuran dimer
37.	Denthyrsinol (4,50-dimethoxy- [1,10]biphenanthrenyl- 2,5,40,70-tetraol	C ₃₀ H ₂₂ O ₆	11477116		<i>Dendrobium thyrifloru</i>	[77]	Dimeric phenanthrenes
38.	Denthyrsinone	C ₃₁ H ₂₂ O ₈	11352948		<i>Dendrobium thyrifloru</i>	[77]	Dimeric phenanthrenes
39.	Didodecyl phthalate (plasticizer)	C ₃₂ H ₅₄ O ₄	17082		<i>Bulbophyllum kaitense</i>	[16]	Benzene dicarboxylic acid

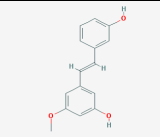
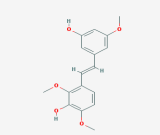
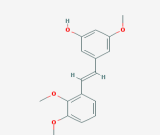
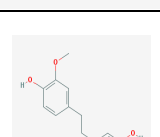
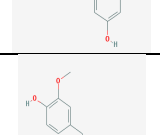
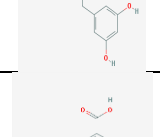
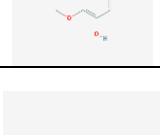
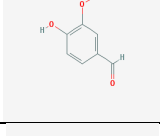
40.	Ephemeranthoquinone.	C ₁₅ H ₁₂ O ₄	10038025		<i>Dendrobium plicatile</i>	[78]	Stilbenoid
41.	Erianthridin	C ₁₆ H ₁₆ O ₄	10401022		<i>Eria convallarioides</i>	[44]	Hydrophenanthrene
42.	Erianthridin (9,10-dihydro-2,7-dihydroxy-3,4-dimethoxyphenanthrene	C ₁₆ H ₁₆ O ₄	10401022		<i>Pholidota chinensis, Maxillaria densa</i>	[61] [54]	Dihydrophenanthrene
43.	Flaccidin 2,6-dihydroxy-7-methoxy-5H-phenanthro[4,5-bcd]pyran-5-one	C ₁₆ H ₁₄ O ₄	14235431		<i>Agrostophyllum callosum</i> <i>Coelogyne flaccid</i>	[3] [15]	Stilbenoid
44.	Flavanthrinin	C ₁₅ H ₁₂ O ₃	14777892		<i>Cremastra appendiculata.</i>	[29]	dihydrophenanthrene
45.	Flavidin	C ₁₅ H ₁₂ O ₃	158594		<i>Vanda coerulea</i>	[72]	Stilbenoid
46.	Gastrodamine	C ₈ H ₁₅ N ₇ O ₂ S ₃	5702160		<i>Gastrodia elata Blume</i>	[51]	Alkaloid,hydroxylamine
47.	Gastrodin	C ₁₃ H ₁₈ O ₇	115067		<i>Cremastra appendiculata</i> <i>Gastrodia elata Blume</i>	[28] [51]	Glucoside
48.	Gigantol	C ₁₆ H ₁₈ O ₄	3085362		<i>Bulbophyllum odoratissimum,</i> <i>Cymbidium goeringii,</i> <i>Dendrobium moniliforme,</i> <i>Vanda coerulea</i>	[21] [30] [41] [72]	Phenolic/Stilbenoid
49.	Gymnopusin (7,9-dihydroxy-2,3,4-trimethoxyphenanthrene) Gymnopusin (2,7-dihydroxy-3,4,9-trimethoxyphenanthrene)	C ₁₇ H ₁₆ O ₅	14505894		<i>Bulbophyllum gymnopus,</i> <i>Maxillaria densa</i>	[45] [54]	phenanthrene
50.	Habenariol	C ₂₁ H ₂₆ O ₅ S	100989770				Phenolic

51.	Hircinol 4-methoxy-9,10- dihydrophenanthrene- 2,5-diol	C ₁₅ H ₁₄ O ₃	442705		<i>Dendrobium Moniliforme, Pholidota chinensis</i>	[41] [61]	Dihydrophenant hrene
52.	Hydroxybenzyl alcohol (pubchem CID: 125);	C ₇ H ₈ O ₂	125		<i>Gastrodia elata Blume</i>	[51]	Phenol
53.	Imbricatin 2,7-dihydroxy-6- methoxy-9,10-dihydro- 5H-phenanthro[4,5- bcd]pyran	C ₁₆ H ₁₄ O ₄	14237636		<i>Agrostophyllum khasiyanum, Agrostophyllum callosum , Pholidota yunnanens, Vanda coerulea</i>	[3] [4] [65] [72]	Stilbenoid
54.	Isoflaccidin 2,7- dihydroxy-6-methoxy- 5H-phenanthro[4,5- bcd]pyran-5-one	C ₁₆ H ₁₀ O ₅	14890491		<i>Agrostophyllum khasiyanum</i>	[4]	9,10 dihydrophenant hropyran/stilben oid
55.	Isooxoflaccidin	C ₁₆ H ₁₂ O ₅	14890492		<i>Agrostophyllum callosum</i>	[3]	Stilbenoid
56.	Lusianthridin	C ₁₅ H ₁₄ O ₃	442702		<i>Pholidota chinensis</i>	[61]	Dihydrophenant hrene
57.	Lusianthridin	C ₁₅ H ₁₄ O ₃	442702		<i>Pholidota yunnanensis Thunia alba</i>	[65] [71]	Dihydrophenant hrene
58.	Methoxycoelonin (6-methoxycoelonin)	C ₁₆ H ₁₆ O ₄	45267920		<i>Vanda coerulea</i>	[72]	Stilbenoid
59.	Methyl 3 – bromo-1 – adamantaneacetate	C ₁₃ H ₁₉ Br O ₂	610084		<i>Bulbophyllum kaitense</i>	[16]	cycloalkane
60.	Moscatin (4,4'- dihydroxy-3,3',5- trimethoxybibenzyl)	C ₁₇ H ₂₀ O ₅	176096		<i>Agrostophyllum khasiyanum , Dendrobium Moniliforme, Dendrobium loddigesii</i>	[4] [41] [80]	Bibenzyl derivative
61.	Moscatin	C ₁₅ H ₁₂ O ₃	194774		<i>Bulbophyllum odoratissimum</i>	[21]	Phenolic

62.	Moupinamide	$C_{18}H_{19}NO_4$	5280537		<i>Dendrobium Moniliforme</i>	[41]	Methoxy phenol, alkaloid
63.	Nonane	C_9H_{20}	8141		<i>Bulbophyllum kaitense</i>	[16]	Acyclic alkane
64.	<i>N-trans-feruloyl 3'-O-methyldopamine</i>	$C_{19}H_{21}NO_5$	14412557		<i>Dendrobium Moniliforme</i>	[41]	Alkaloid
65.	Nudol	$C_{16}H_{14}O_4$	158975		<i>Appendicula reflexa, Eria convallarioides</i>	[8] [43]	monomeric phenanthrenes
66.	Orchinol	$C_{16}H_{16}O_3$	181686		<i>Agrostophyllum callosum</i>	[3]	9,10-dihydrophenanthrene
67.	Paprazine Here structure is of n-cis-paprazine	$C_{17}H_{17}NO_3$	13939145		<i>Dendrobium Moniliforme</i>	[41]	Alkaloid
68.	Parishin	$C_{44}H_{54}O_2$	44421666		<i>Gastrodia elata Blume</i>	[51]	Phenolic glucoside
69.	Parishin B	$C_{32}H_{40}O_{19}$	44715528		<i>Gastrodia elata Blume</i>	[51]	Phenolic glucoside
70.	Parishin C	$C_{32}H_{40}O_{19}$	46173915		<i>Gastrodia elata Blume</i>	[51]	Phenolic glucoside
71.	Pendulin (3-hydroxy-2,4,6,7,8-pentamethoxyphenanthrene)	$C_{24}H_{26}O_{12}$	44259755		<i>Cymbidium pendulum</i>	[30]	phenanthrene derivative,

72.	Phoyunbene A	C ₁₇ H ₁₈ O ₅	11522311		<i>Pholidota yunnanensis</i>	[63]	Stilbene
73.	Phoyunbene B	C ₁₇ H ₁₈ O ₅	11558520		<i>Pholidota yunnanensis</i>	[63]	Stilbene
74.	Phoyunbene C	C ₁₆ H ₁₆ O ₄	11507326		<i>Pholidota yunnanensis</i>	[63]	Stilbene
75.	Phoyunbene D	C ₁₇ H ₁₈ O ₄ S			<i>Pholidota yunnanensis</i>	[63]	bibenzylidihydro phenanthrene) ether/ Stilbene
76.	Phoyunnanin D	C ₃₀ H ₂₈ O ₆	101380568		<i>Pholidota yunnanensis</i>	[63]	bibenzylidihydro phenanthrene) ether
77.	Phoyunnanin E	C ₃₀ H ₂₆ O ₅	101380569		<i>Pholidota yunnanensis</i>	[63]	bibenzylidihydro phenanthrene) ether
78.	Phoyunnanins C 4,4',7,7'-tetrahydroxy- 2,2'-dimethoxy- 9,9',10,10'-tetrahydro- 1,6'-biphenanthrene	C ₃₀ H ₂₆ O ₆	16220719		<i>Pholidota yunnanensis</i>	[65]	bibenzylidihydro phenanthrene) ether
79.	<i>P</i> -hydroxybenzaldehyde	C ₇ H ₆ O ₂	126		<i>Dendrobium Moniliforme</i>	[40]	Phenolic
80.	<i>P</i> -hydroxyphenylpropionic acid	C ₉ H ₁₀ O ₃	10394		<i>Dendrobium Moniliforme</i>	[41]	Phenolic
81.	Pinobanksin	C ₁₅ H ₁₂ O ₅	73202		<i>Bulbophyllum odoratissimum</i>	[18]	Flavonoids

82.	Pleionesins C	$C_{27}H_{26}O_7$	102097659		<i>Pleione yunnanensis</i>	[67]	Dihydrophenanthrofurans
83.	Protocatechuic acid	$C_7H_6O_4$	72		<i>Dendrobium moniliforme</i>	[41]	Phenolic
84.	Quercetin	$C_{15}H_{10}O_7$	5280343		<i>D. tosaense</i>	[81]	Polyphenol flavonoids
85.	Shanciol F	$C_{25}H_{24}O_6$	102316582		<i>Pleione bulbocodioides</i>	[66]	Phenanthrofurans
86.	Sinensols H	$C_{27}H_{26}O_7$	102097660		<i>Spiranthes sinensis</i>	[69]	Dihydrophenanthrenes
87.	Sinetrucallol	$C_{31}H_{52}O$	101117672		<i>Spiranthes sinensis</i>	[69]	Homocyclotirucallane
88.	Sitosterol	$C_{29}H_{50}O$	222284		<i>Eria convallarioides</i> , <i>Dendrobium moniliforme</i> , <i>Gastrodia elata</i> Blume	[43] [41] [50]	Steroid
89.	Squalene	$C_{30}H_{50}$	638072		<i>Bulbophyllum kaitense</i>	[16]	Terpene
90.	Stigmasterol	$C_{29}H_{48}O$	5280794		<i>Arundina</i> and <i>Cattleya</i>	[74]	Glycoside
91.	Syringaldehyde	$C_9H_{10}O_4$	8655		<i>Bulbophyllum odoratissimum</i>	[21]	Phenolic
92.	Tanshinone IIA	$C_{19}H_{18}O_3$	164676		<i>Pholidota cantonensis</i>	[59]	Phenanthrenes-quinone

93.	Thunalbene 3,3'-dihydroxy-5- methoxystilbene	C ₁₅ H ₁₄ O ₃	25756094		<i>Thunia alba</i>	[71]	Stilbene
94.	Phoyunbene A (Trans-3,3'-dihydroxy-2',4',5-trimethoxystilbene)	C ₁₇ H ₁₈ O ₅	11522311		<i>Pholidota yunnanensis</i>	[63]	Stilbene
95.	phoyunbene B (Trans-3-hydroxy-2',3',5-trimethoxystilbene)	C ₁₇ H ₁₈ O ₄	11601663		<i>Pholidota yunnanensis</i>	[63]	Stilbene
96.	Tristin	C ₁₅ H ₁₆ O ₄	15736297		<i>Bulbophyllum odoratissimum</i>	[21]	Alcohol
97.	Tristin	C ₁₅ H ₁₆ O ₄	15736297		<i>Dendrobium cumulatum and Bulbophyllum triste</i>	[79]	Bibenzyl
98.	Vanillic acid	C ₈ H ₈ O ₄	8468		<i>Dendrobium moniliforme</i>	[41]	Dihydroxy benzoic acid
				<i>Bulbophyllum odoratissimum</i>	[21]		
99.	Vanillin 4-hydroxy-3- methoxybenzaldehyde	C ₈ H ₈ O ₃	1183		<i>Dendrobium moniliforme</i>	[41]	Phenolic aldehyde
100	Vanillyl alcohol	C ₈ H ₁₀ O ₃	62348		<i>Gastrodia elata Blume</i>	[51]	Phenolic

Abbreviations

2D: 2 dimensional structure;

Pub Chem CID: Pub Chem compound identifier

CONCLUSION

Here we gathered the phytochemical and pharmacology potential of important medicinal plants of family Orchidaceae. From the above data it is justified that family has huge potential for novel drug development leads. The effectiveness of these phytochemicals needs to be validated *in vivo* for further investigation. Among the orchid members, the genus Bletilla, Bulbophyllum, Coelogyne, Cremastra, Dendrobium, Eria, Pholidota have been more explored as compared to others. Our analysis of published research showed that most of the work was carried out using plant crude extracts which is not much useful for further drug development. Consequently future research must be focused on the isolation and identification of active compounds with pharmacological activity rather than simply screening the crude extracts. This review is a readymade plan for

phytochemical constituents and pharmacology of Orchidaceae family for the future researchers dealing with orchids. It is also recommended here for future researchers that highly sophisticated hyphenated techniques should be included for research to enhance the speed of drug development.

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