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The Neglected Anticancer Phytoceutical Treasures from the Nilgiris Biosphere: A Short Review

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Authors' contributions

This work was carried out in collaboration between both authors. Author MVNLC managed the literature searches and drafted the manuscript, Author PS corrected the manuscript and arranged it in a scientific manner. Both authors read and approved the final manuscript.

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Review Article

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ABSTRACT

Background: Cancer is the second most dreadful disease of the globe and nearly 100 different types of cancer have been identified. The main problem with the cancer is its resistance and many existed synthetic molecules are becoming clinically insignificant on exposure to cancer cell over a long time.
Scope: This makes the scientists to look over major alternative sources like plants and algae to discover new phytoceuticals against cancer. However many new anticancer phytochemicals have been discovered from the Nilgiris Biosphere, not even a single phytochemical found to be clinically significant or the potent research has been stopped at preclinical level itself.
Conclusion: Hence this review is focused on the important neglected phytochemicals that have been discovered from the Nilgiris biosphere and the research had been stopped at preclinical level. Hence a proper step has to be taken by the researchers to rejuvenate this left phytoceuticals to be a clinically significant anticancer phytoceutical and have to reach over all globe at an economical cost.

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Keywords: Nilgiris biosphere; phytoceuticals & anticancer.

1. NILGIRIS BIOSPHERE

The Nilgiris Biosphere in Tamil Nadu is part of the Western Ghats and lies between 11°, 12' and 11°, 43' north and 76°, 14' and 77°, 1' east in the north of western part of Tamil Nadu[1]. The biosphere covers up to 2,452.50 km^2. It is basically a hilly region, situated at an elevation of 2000 to 2,600 masl. Almost the entire district lies in the Western Ghats. Its latitudinal and longitudinal dimensions being 130 km (Latitude: 10 - 38 WP 11-49N) by 185 km (Longitude: 76° E to 77.15° E). The Nilgiris district is bounded by Mysore district of Karnataka and Wayanad district of Kerala in the North, Malappuram and Palakkad districts of Kerala in the West, Coimbatore district of Tamil Nadu in the South and Erode district of Tamil Nadu and Chamarajanagar district of Karnataka in the East. In Nilgiris district, the topography is rolling and steep. About 60% of the cultivable land falls under the slopes ranging from 16 to 35%.The altitude of the Nilgiris results in a much cooler and wetter climate than the surrounding plains, so the area is popular as a retreat from the summer heat. The temperature remains to the maximum of 25°C and reaches a minimum of 0°C [1-2]. It was originally tribal land and was occupied by the today around what is now the Ooty area, and by the Kotas around what is now the Kotagiri (Kothar Keri) area. The Badagas are one of the major non-tribal populations in the district who reside in the mountain. Although the Nilgiri hills are mentioned in the Ramayana of Valmiki (estimated by Western scholars to have been recorded in the second century BC), they remained all but undiscovered by Europeans until 1602.

This Biosphere may be considered as a neglected authentic treasure house for many phytochemicals (both explored and unexplored). Many anticancer phytoceutical treasures were discovered from the plants and algae from this biosphere and this biosphere is a favourite phytochemical hub for many phytochemists for the discovery of phytoceuticals having new phytochemical structures.

2. ETHNO MEDICINAL STRENGTHS OF THE NILGIRIS

Nilgiris, the well-known reservoir is famous for its biodiversity and also known for its ethnic diversity groups like Kurumbas, Todas, Irulas, Kattunayakas, Paniyas and Kotas. The entire globe is focusing on these ethnic races to discover a new phytoceuticals to treat various diseases.

All these ethnic races have their own techniques and phytoceutical libraries in utilizing these natural resources to treat many ailments which they are gathering from generations to generations learning from the school of medicine known as the Mother Nature. The previous ethnic medicinal literature states that there are hundreds of explored plants that can be used as anticancer agents and many plants yet to be explored from this biosphere [3].

However, not even single anticancer phytoceutical from this biosphere have been brought to clinical significant level. This may be due to lack of funds and also rushing up to another new plant after getting a degree without trying hard to prove or modify its clinical significance level. Except for few institutions like JSS College of Pharmacy, Rocklands, Ooty and no other institute is trying hard to bring a good neglected phytoceutical treasures to a clinically significant level [4-5].

Hence this review will be an excellent study article for the researchers to focus again on the neglected phytoceutical treasures for their research and funding to further start their anticancer research to bring those phytoceuticals to a clinically significant level. Based on the field and research expertise from our researchers we are trying to explore the information against on these neglected treasures.

3. ANTICANCER PHYTOCEUTICALS FROM THE NILGIRIS

3.1 *Anaphalis neelgerriana*

Family: Compositae/ Asteraceae.
Habitat: A perennial herb in the Nilgiri Hills at 2100 to 2500 mt
Common Names:
Ayurvedic: Raktaskandana, English Name: pearly everlasting
Folk uses: Kaatplaaster (Nilgiri hills).
Anticancer phytoceuticals : Astragalin [6],
Chemistry: Acyl flavonoid glycoside
Mechanism of Action: inhibiting the NF-κB pathway [7] & Reduces Hexokinase 2 through Increasing miR-125b [8]
Clinical significance: Unknown

3.2 *Arisaema tortuosum*

Family: Araceae
Habitat: It is a herb Indigenous to Peninsular (endemic) India; found in temperate regions of the Nilgiris.
Common Names:
Hindi: Bagh Jandhra • Marathi: Sardacha-jad • Kannada: Katu senai, Amu-mani-gidda Konkani: Sarpache-kamdo • Nepali: Sarpako Makai, Baanko, Beerabaanko.
Folk uses Wound healing and Anti-inflammatory [9].
English name: The Whipcord cobra lily
Anticancer phytoceuticals: Lecitin [10-11].
Chemistry: Proteins [12].
Mechanism of action: Not clear / not understood in depth
Clinical significance: Unknown.

3.3 *Berberis lycium*

Family: Berberidaceae
Habitat: It is a semi-deciduous shrub that Found at subtropical to temperate regions of the Nilgiris.
Common Names:
English: Raisin Berberry, Indian lycium ; Hindi: Chitra; Sanskrit: Daruharidra; Tamil Name: kasturimanjal.
Folk uses Todas of Nedimand tribes, Nilgiris, India, grind the roots of B. tinctoria with water and administer it for stomachache, especially in the treatment of worms. The bark is used for stomach disorders of Buffaloes, along with butter. Fruits are eaten by Kotas of Kollimalai [12].
Anticancer Phytoceuticals: Berberine [13].
Chemistry: Benzyl isoquinoline alkaloid
Mechanism of action: Transcriptional regulation of some oncogene and carcinogenesis-related gene expression and interaction with both DNA and RNA are also well documented. Besides, berberine is a broad spectrum enzyme inhibitor, which affects N-acetyltransferase, cyclooxygenase-2, and topoisomerase activities and gene/protein expression [14].
Clinical significance: No reports

3.4 *Cynoglossum zeylanicum*

Family: Boraginaceae
Habitat: It is an erect herb that Found throughout the district, 900-2400 m altitude ranges.
Common Names:
English: Chinese Forget-me-not and Chinese hound's tongue, Hindi: andhahuli • Kannada: armada soppu, Tamil: picnic ottarai • Telugu: Kada anthrone.
Folk uses: The plant is used in traditional Chinese medicine to treat a cough, scrofula and to stop the bleeding of wounds [15] and The Kota tribes of the Nilgiris uses this plant leaves (q.s.) along with leaves of *Rubus ellipticus* (Kota name Penmulp) and Rubusracemosus (Kota name Gundmulp) equal quantity are chewed together to relieve symptoms such as head ache, fever and giddiness may be caused by evil spirits [1].
Anticancer Phytoceuticals: Heliotrine [16], Heliosupine [17], Rinderine [18], Echinatine [19] and Cynaustraline [20].
Chemistry: Pyrrolizidine Alkaloids
Mechanism of action: still unclear
Clinical Significance: No reports

3.5 *Euphorbia royleana*

Family: Euphorbiaceae
Habitat: A cactus-like a shrub , native of India and Sri Lanka; found throughout the district; 1500-1200 m ranges.
Common Names : English : Sullu spurge , Hindi: Chhun, danda thor, senhur, shakar pitan • Nepali: सिउन्डी Siundee • Sanskrit: nanda, nisrinsapatra, saptala • Urdu: Thuhar.
Folk uses: A common medicinal plant of India and used extensively as folk medicine and its latex in small doses is a purgative, antihelmintic properties and also as hair tonic[20]. In Ayurveda, the latex of this plant is commonly known as gomutra shilajit used in the treatment of many diseases like male impotency etc[21].
Anticancer Phytoceuticals: Diterpenoids, no phytoceutical was isolated from this species and it has been neglected [22].
Chemistry: Terpenoidal coumarins
Mechanism of Action : -
Clinical Significance: No reports

3.6 *Habenaria longicornulata*

Family: Orchidaceae
Habitat: It is a high terrestrial herb Indigenous to Western Ghats (endemic); found temperate regions (shola grass land) of the district; 2000 – 2600 m altitude ranges.
Common Names:
English: Medicinal orchid, Tamil: Chalamastry Kelang
Folk Uses Tubers stored in honey for 5 days and can be taken internally to treat nervous disorders15, also as an anticancer agent along with curcuma longa by some tribes in western ghats [23].
Anticancer Phytoceuticals: Unknown

Mechanism of action: No single attempt was made by researchers.
Clinical significance: Unknown.

3.7 *Leucas lavandulifolia*

Family: Lamiaceae
Habitat: An annual erect herb, distributed all over the Nilgiris and Kerala districts. Found in subtropical to temperate regions of the distinct; 1000-2500 m ranges.
Common names: English: common leucas • **Hindi**: chhota-halkusa, गोफा gopha, गुमी gumi, गुम्मा gumma • **Kannada**: thumbe • **Malayalam**: tumba, tumpa • **Marathi**: तांब tamba, तुंबी tumbi • **Oriya**: bhutamari • Sanskrit: द्रोणपुष्पि dronpushpi • **Tamil**: kadar kumbam, sudarpoo tonri, தூலை tulai, தும்பை tumpai • **Telugu**: తెల్ల తుమ్మి tella tummi ;
Folk uses : In treatment of diarrhea, as an antivenin, anti-inflammatory and in skin diseases [24].
Anticancer Phytoceuticals: These species were explored only for its cytotoxicities [25] but not for its anticancer potentiality and still not even single phytoceutical was developed from this plant, hence there is a lots of scope for the researchers to carry out indepth research for discovery of new anticancer molecules or leads.
Chemistry: Phenols, alkaloids and coumarins, but still in-depth research was not carried out on these species for its anticancer potentiality.
Mechanism of Action: Clinical Significance: No reports

3.8 *Mahonia leschenaultii*

Family: Berberidaceae
Habitat: A erect or climbing shrub that found commonly in both subtropical and temperate sholas.
Common Names: English: Holy leaved Berry, Mullu Kadambu, Thoori
Folk uses: A plant is of potential value as a medicine besides its used in religious ceremonies. In Toda term, it is called Thovari which means Purifier [26].
Anticancer phytoceuticals: Berberine [27]
Mechanism of action: Human Topoisomerase- I & II inhibitor [28].
Clinical significance: Unknown

3.9 *Mirabilis jalapa*

Family: Nyctaginaceae
Habitat: An annual herb native of Peru; introduced and cultivated or sometimes run wild throughout the district.
Common names: English: Four O'clock, Beauty-of-the-night, Marvel of Peru • Hindi: गुल अब्बास Gul abbas, Gulbakshi • Manipuri: মুকাক লৈ Mukak lei • Marathi: गुलबस Gulabas or गुलबास Gulabaas, सायंकाळें saayankaale • Tamil: Pattarashu, அந்தி மந்தாரை Andhi Mandarai [29].
Folk uses: As Purgative, emetic, amenorrhea and dysmenorrheal in folk women [30]
Anticancer phytoceuticals: mirabijalone A-E [31], Unknown Proteins [32].
Mechanism of action: Human Topoisomerase- I & II inhibitor [33].
Clinical significance: Unknown

3.10 *Persicaria Chinensis*

Family: Polygonaceae
Habitat: A perennial herby weed, a native of Africa, Asia, India to Malaysia, found in throughout the district up to 900 – 1200 m altitude ranges.
Common names: English: Chinese Knotweed • Manipuri: অংগোম য়েন্সিল Angom yensil • Marathi: परल Paral • Assamese: Kelnap [34].
Folk uses : the species of Persicaria plays a vital role as alternative medicines, since they have been used for a long time to treat colic pain, skin conditions such as scabies, boils, abscesses, ringworms, diuretic, inflammatory conditions like pain, knee pain, rheumatic pain, gout, menstrual pain and amenorrhoea, etc. They are also used as traditional medicines in conditions like diarrhoea, dyspepsia, itchy skin and haemorrhoids [35].
Anticancer Phytoceuticals: Even though evidence claimed that this plant having anticancer properties, not even a single anticancer phytoceutical has been isolated from this plant [36].
Mechanism of action: Unclear
Clinical Significance**:** Unknown

3.11 *Rubia cordifolia*

Family: Rubiaceae
Habitat: It is a scrambling herb native of Africa, Asia, India to Malaysia, found in throughout the district up to 900 – 1200 m altitude ranges.

Common names: English : Indian madder • Hindi: मजीठ Majith, लचकुरा Lachkura • Kannada: Chitravalli, Manjista • Khasi: Soh misem • Malayalam: Chovvallikkoti, Man-chetti • Manipuri: Moyum • Marathi: Majisth, Manjista, Chitravalli • Tibetan: Manjith • Nepali: मजीठो Majitho • Oriya: Rongo chero • Sanskrit: अरुणा Aruna, Asra, Bhandi, Bhandiralatika • Tamil: Manjitti, Sevvelli, Shevelli • Telugu: Chiranji, Manjishta • Urdu: Majeeth, Majith nim kofta [37].

Folk uses: The roots of *Rubia cordifolia* is widely used in Ayurveda; this is commonly known in Ayurveda as Manjistha (or Manjista or Manjishta) and in Hindi, it is known as Manjith. It is known as btsod in Traditional Tibetan Medicine used to treat blood disorders; spread heat, excess heat in the lungs, kidneys, and intestines; reduce swelling [38-39].

Anticancer Phytoceutical: 1-Hydroxy-2-methylanthraquinone [40].

Mechanism of Action: Acceleration of cancer cell apoptosis through the mitochondrial pathway and arrest the cell growth through the protein tyrosine kinase inhibition [41].

Clinical Significance: Significant or promising anticancer activity by inhibiting DNA Caspase 3, however, there is no clinical studies carried on this molecule or no clinical evidence [42]

3.12 *Sapindus mukorosii*

Family: Sapindaceae

Habitat: A shrub that is native to India (Peninsular), Sri Lanka and Burma; found in tropical regions; 800-1900m attitude ranges.

Common Names: English : Chinese Soapberry, North Indian soapnut, Washing nuts • Hindi: फेनिल phenil, रिष्ट risht, रिष्टक rishtak, रीठा ritha • Manipuri: ꯀꯦꯀꯨ hai kya Kekru • Marathi: फेनिल phenil • Urdu: پھینـــل phenil, هاڑري ritha • Assamese: শাইঠা aritha • Mizo: hlingsi • Sanskrit: ह्रष्टः hrishtah, फेनका phenaka, फेनिल phenil, रिष्टः rishtah, रिष्टक rishtak, रीठा rita, सारिष्ट sarishta, ऊर्ध्वशोधनः urdhvashodhanah • Nepali: रीट्ठा rittha

Folk uses: Expectorant [43], Eczema, Psoriasis [44]

Anticancer Phytoceuticals: Hederagenin [45]

Mechanism of Action: Inhibition of Nrf2-ARE antioxidant pathway [46]

Clinical Significance: Unknown

3.13 *Schleichera oleosa*

Family: Sapindaceae

Habitat: A beautiful tree common in Java, Sri Lanka, SE Asia, Malaysia and India (tropical Himalayas); found throughout sub-tropical regions of the district.

Common names: English : Ceylon oak, Lac tree, Gum lac tree • Hindi: Kusum कुसुम • Telugu: Posku Marathi: कुसुम्ब Kusumb • Gujarati: કોસુમ્બ Kosumb • Tamil: Kumbadiri • Malayalam: Cottilai • Kannada: Cakota.

Folk uses: Astringent, Antifungal, Antimicrobial [47]

Anticancer phytoceuticals: Schleicherastatins , Schleicheols [48], Betulinic acid [49].

Mechanism of Action: Trigger the mitochondrial pathway of apoptosis in cancer cells [50].

Clinical significance: Topical agent in phase I/II clinical trial for the treatment of dysplastic nevi [50].

4. ANTICANCER PHYTOCEUTICALS FROM THE WEEDS OF THE NILGIRIS

4.1 *Cytisus scoparius*

Family: Fabaceae

Habitat: A herby weed that is widely distributed on all over the Nilgiris.

Common names: *Spartium scoparium* (Linn.). *Genista scoparius* (Lam.). *Sarothamnus scoparius (*Koch). English: Scotch Broom Tops. Irish Tops. Basam. Bisom. Bizzom. Browse. Brum. Breeam. Green Broom.

Folk uses: Jaundice [51]

Anticancer phytoceuticals: Ruscogenin [52], (1E-1-hydroxyprop-1-en-2-yl (2E) - 3-(4-hydroxy-3-methoxyphenyl) prop-2-enoate) [52].

Mechanism of Action: the Dual inhibiting activity of dual Human Topoisomerases I & II [53].

Clinical significance: Restricted only to *in-silico* and *in-vitro* studies, however, clinical significance is unclear.

4.2 *Solanum mauritianum*

Family: Solanaceae

Habitat: A weedy herb, widely distributed on all over the Nilgiris.

Common names: *Solanum auriculatum*, English: Tobacco bush weed.

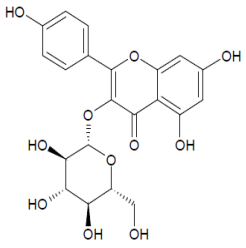
Folk uses: No claims

Anticancer Phytoceuticals : Tetrahydro-2-(hydroxymethyl)-6-(octadecahydro- 2, 7, 10a-trimethyl-1-propylchrysen-8-yloxy)- 2H-Pyran-3, 4, 5-triol [54].

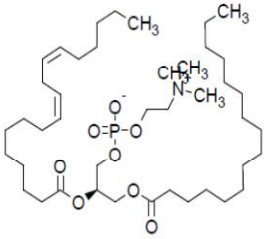
Table 1. Reported anticancer phytochemicals from the plants of the Nilgiris

S.no	Name of the plant	Name of the anticancer phytoceutical	Pub chem ID/CAS ID	Clinical significance
1.	*Anaphalis neelgerriana* DC.	Astragalin	5282102	Unknown
2.	*Arisaema tortuosum*	Lecithin	6850739	Unknown
3.	*Berberis lyceum*	Berberine	2353	Unknown
4.	*Habenaria longicorn*	Unknown	-	Unknown
5.	*Mahonia leschenaultia*	Berberine	2353	Unknown
6.	*Cynoglossum zeylanicum*	Heliotrine	906426	Unknown
		Heliosupine	5376265	Unknown
		Rendering	442758	Unknown
		Echinatine	22384	Unknown
		Cynaustraline	3454277	Unknown
7.	*Euphorbia royleana*	Mixture of Diterpenoids	-	Unknown
8.	*Mirabilis jalapa*	Mirabijalone D	11013288	Unknown
9.	*Persicaria Chinensis*	-	-	Unknown
10.	*Rubia cordifolia*	Anthraquinone, 1-hydroxy-2-methyl-	160817	Unknown
11.	*Sapindus mukorosii*	Hederagenin	73299	Unknown
12.	*Schleichera oleosa*	Schleicherastatins, Betulinic acid.	-, 64971	Topical agent in phase I/II clinical trial for the treatment of dysplastic nevi.
13.	*Cytisus scoparius*	Ruscogenin, (1E-1-hydroxyprop-1-en-2-yl (2E) - 3-(4-hydroxy-3-methoxyphenyl) prop-2-enoate)	-	Restricted only to in-silico and in-vitro studies, however clinical significance is unclear.
14.	*Solanum mauritianum*	Tetrahydro-2- (hydroxymethyl)-6-(octadecahydro- 2, 7, 10a-trimethyl-1-propylchrysen-8-yloxy)- 2H-Pyran-3, 4, 5-triol	-	Restricted only to in-silico and in-vitro studies, however clinical significance is unclear.
15.	*Erigeron karvinskianus*	Naringenin , 7- Methoxy hesperetin	439246, 14157910	Only restricted to molecular docking studies and proved satisfactory results on the Dual inhibiting activity of dual Human Topoisomerases I & II.

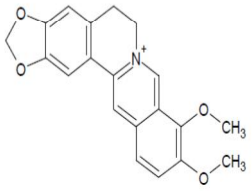
S.no	Name of the plant	Name of the anticancer phytoceutical	Pub chem ID/CAS ID	Clinical significance
16.	*Phytolacca dodecandra*	Phytolacoside B & E	-	Only restricted to molecular docking studies and proved satisfactory results on the Dual inhibiting activity of dual Human Topoisomerases I & II.
17.	*Cnicus Wallich*	Lupeol	259846	Only restricted to molecular docking studies and proved satisfactory results on the Dual inhibiting activity of dual Human Topoisomerases I & II.
18.	*Cestrum aurantiacum*	Parquisoside-A	-	Only restricted to molecular docking studies and proved satisfactory results on the Dual inhibiting activity of dual Human Topoisomerases I & II.



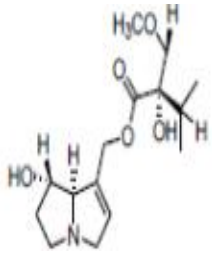
1. Astragalin



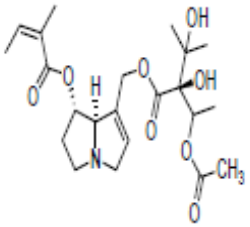
2. Lecithin



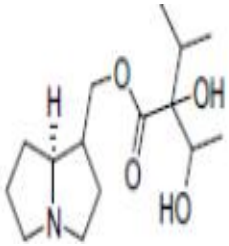
3. Berberine



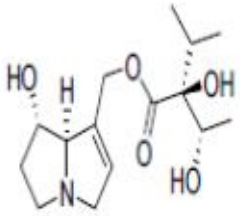
3. Heliotrine



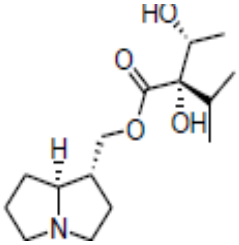
4. Heliosupine



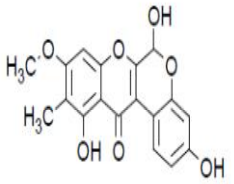
5. Rendering



6. Echinatine



7. Cynaustraline



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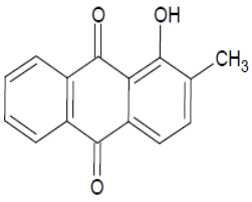

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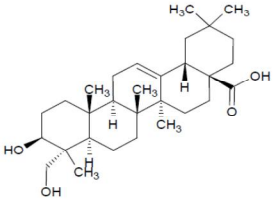
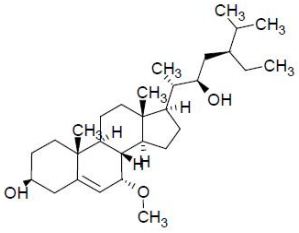
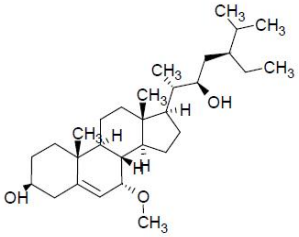


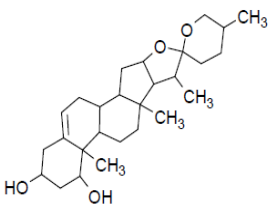
10. Hederagenin



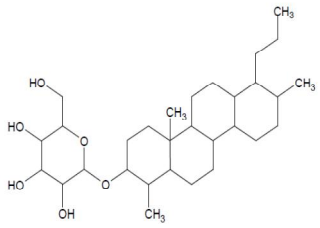
11. Schleicherastatins



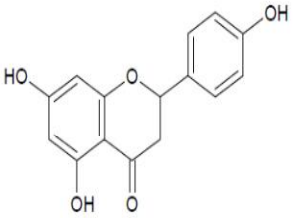
12. Betulinic acid



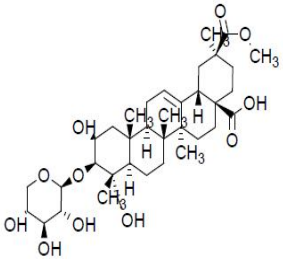
13. Ruscogenin



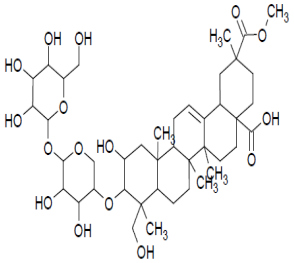
14. (1E-1-hydroxypropyl-1-en-2-yr (2E) – 3-(4-hydroxy-3-methoxyphenyl) prop-2-enoate)



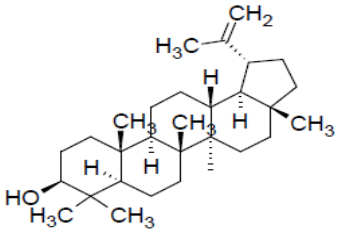
15. Narangenin



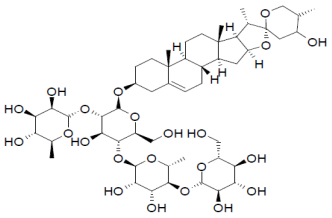
16.Phytolacoside B



17. Phytolacoside



18. Lupeol



19. Parquisoside- A

Fig. 1. Missing Phytoceuticals from the plants of the Nilgiris

Mechanism of Action: the Dual inhibiting activity of dual Human Topoisomerases I & II [54].
Clinical significance: Restricted only to *in-silico* and in-vitro studies, however, clinical significance is unclear [54].

4.3 *Erigeron karvinskianus*

Family: Asteraceae
Habitat: A weedy herb widely distributed on all over the Nilgiris.
Common names: Mexican fleabane, Latin American fleabane, English: Santa Barbara daisy or Spanish daisy.
Anticancer Phytoceuticals: Naringenin, 7-Methoxy hesperetin [55].
Mechanism of Action: Only restricted to molecular docking studies and proved satisfactory results on the Dual inhibiting activity of dual Human Topoisomerases I & II [55].
Clinical significance: Unknown.

4.4 *Phytolacca dodecandra*

Family: Phytolaccaceae
Habitat: A sturdy weed, widely distributed on all over the Nilgiris.
Common names: English: African soap berry, West African: Ghana Akan-Twi choro (auctt.) guinea: kissi funded un'do.
Anticancer phytoceuticals: Phytolaccoside B & E
Mechanism of Action: Only restricted to molecular docking studies and proved satisfactory results on the Dual inhibiting activity of dual Human Topoisomerases I & II [56].
Clinical significance: Unknown.

4.5 *Cnicus Wallich*

Family: Asteraceae
Habitat: A sturdy weed widely distributed on all over the Nilgiris.
Common Names: English: Wallich's Thistle, Hindi: Bungee, Nepali: Thakal, Kanta.
Anticancer phytoceuticals: Lupeol [56]
Mechanism of Action: Only restricted to molecular docking studies and proved satisfactory results on the Dual inhibiting activity of dual Human Topoisomerases I & II [56].
Clinical significance: Unknown.

4.6 *Cestrum aurantiacum*

Family: Solanaceae
Habitat: A sturdy weed widely distributed on all over the Nilgiris.
Common Names: English: Orange Cestrum, Yellow Cestrum, Yellow Shrub Jessamine.
Anticancer phytoceuticals: Parquisoside-A[56]
Mechanism of Action: Only restricted to molecular docking studies and proved satisfactory results on the Dual inhibiting activity of dual Human Topoisomerases I & II [57]
Clinical significance: Unknown

5. CONCLUSION

Even though many anticancer molecules or plants have been discovered from the Nilgiris biosphere, not even a single molecule from this biosphere got clinically significant status. Most of the research carried out on the plants of this biosphere is left incomplete at preclinical or in-vitro molecular mechanism studies. A not even single attempt has been made to bring these phytochemical treasures to be clinically safe and potent. Hence this review is focused on these neglected anticancer treasures as a trail to remember the phytochemical researchers to fill this lacuna and to make them clinically potent instead of going to new plants. Hence there is a lot of chance to for the researchers to work on these phytochemical treasures in order to dedicate a clinically safe and potent structurally.

The authors are interested in the Niligiris flora and how these ethnomedicinal plants can be used in cancer drug discovery. The authors first time started their valuable contribution on the major weeds as an anticancer drugs/ leads. However Further research on this flora is in progress and trying to get funds from various organizations and in progress.

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CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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