

A REVIEW ON ANTIFERTILITY ACTIVITY OF PLANTS OF CHAMBAL RIVERINE

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ABSTRACT

Indian sub-continent showing very high diversity in both ecological and geographical aspects. In India, medicinal plants are widely distributed in different climatic conditions and are abundant in a mountainous region or riverine area. In this review, are being discussed anti-fertility properties of India's well-known Chambal riverine flora. This area is rich in many medicinal plants as *Acyranthus aspera*, *Acacia catechu*, *Nelumbo nucifera*, *Nyctanthes arbortristis*, *Mimosa pudica*, *Adhatoda vasica*, *Calotropis gigantea*, *Pergularia daemia*, *Vicoa indica*, etc. These plants possess potential antifertility activity and many phytoconstituents, responsible for antispermato-genic, anti-implantation, antio-vulatory, antiandrogenic, and many more activities. Hence, this review comprises a brief study of some medicinal plants found in Chambal riverine and showing the comprehensive antifertility activity of those plants.

Keywords: Medicinal plants, Chambal riverine, Phytoconstituents, Antifertility.

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INTRODUCTION**India**

India is an Asian country located in the northern hemisphere. The coordinates of India are 21°N and 78°E. It is known as one of the most developing and overpopulated countries. It is rich in demographic aspects as well as geographical. It shows a high diversity in climatic and geographical conditions, thus results in ecological biodiversity.

Rajasthan

Rajasthan is placed in the north-western zone of India. It is situated in north to south - 23°03' N-30°12' N and west to east 69°30' E-78°17' E. This state shows different types of geographies from northwest to south-east including the Great Thar Desert and widely distributed riverine of Chambal River. Given the extreme weather around the year, Rajasthan is home of very diverse and unique vegetation. There are many rivers in Rajasthan which are seasonal or perennial. Among these rivers, Chambal is perennial and is popularly known as "Kamdhenu" of Rajasthan.

CHAMBAL RIVERINE

Chambal is a perennial river flowing through three states of India - Madhya Pradesh, Rajasthan, and Uttar Pradesh. It is originated from Mahu (hills of Janapoa, Vindhya Range) near Indore, Madhya Pradesh and then passes through Rajasthan and tribute to Yamuna in Uttar Pradesh. The total length of this river is 885 km. The dense deciduous forest area formed around Chambal is called "Beehad."

This area lies in the semi-arid zone of north-western part of India at the border of Madhya Pradesh, Rajasthan, and Uttar Pradesh and consists vegetation of ravine thorn forest [1]. Traditionally, herbal extracts have been used in Ayurvedic system of medicine to treat various ailments using crude extracts of plants which included leaves, barks, stem bark, root, fruit, flowers, and seed. Thorny bushes or small trees are commonly found in Chambal area and include *Capparis decidua*, *Capparis sepiaria*, *Balanites aegyptiaca*, *Acacia senegal*, *Acacia nilotica*, *Acacia leucophloea*, *Prosopis juliflora*, *Butea monosperma*, *Maytenus emarginata*, *Tamarix* sps., *Salvadora persica*, *Salvadora oleoides*, *Crotalaria medicaginea*, *Crotalaria burhia*, *Clerodendrum phlomidis*, *Calotropis procera*, *Xanthium indicum*, *Ziziphus xylopyrus*, *Holoptelea integrifolia*, *Acacia arabica*, *Aegle marmelos*, *Ziziphus mauritiana*,

A. leucophloea, and *Leptadenia pyrotechnica* as well as climbers such as *Maerua oblongifolia*, *Pergularia daemia*, and *Ceropegia bulbosa* herbs as *Argemone mexicana*, *Tephrosia purpurea*, *Cleome viscosa*, *Tribulus terrestris*, *Glinus lotoides*, *Sericostoma pauciflorum*, *Rivea* sps., *Ipomoea* sps., *Pedaliium murex*, *Sesamum mulayanum*, *Lepidaagathis* sps., *Boerhavia diffusa*, etc. [2]. Many of above mentioned are medicinal plants. A plant is termed as medicinal if the plant harbors curative elements or properties in one or more of its organs. These plants comprise many pharmacological properties such as antibacterial, antimalarial, antidiabetic, anticancerous, and antifertility.

In the Indian context of exploding population growth, the use of plant extracts (methanolic, ethanolic, petroleum ether, benzene, and acetone) in the regulation of fertility attracted the attention of investigators because they can have better cultural acceptability and fewer side effects. Thus, the natural products offer a good scope in the search for a contraceptive for use in male and female. Development of an effective method of fertility control is the need of the today. Therefore, it is necessary to screen and use biologically active plant constituents. In the antifertility activity, plants constituents act as inhibition of spermatogenesis, suppression of sperm motility in males and estrous cycle disruptors, antiestrogenic effect, anti-implantation in females. In this review, we are discussing about some medicinal plants of Chambal riverine or catchment area, possessing comprehensive antifertility activity (Table 1).

CONCLUSION

Plants have been a wide source of medicines in the past centuries, and at present, scientists and the general public had recognized their value as a huge source of new as well as complimentary medicinal products [151]. The medical historians have recorded plants that could be used as contraceptive, emmenagogues, and abortifacient [152]. This history of medicinal plants as treating and regulating fertility issues, realized that medicinal plants can play a very important role in future reproductive health-care system. At present, researchers have been using this traditional information for regulating and curing fertility problems. Study and observations of medicinal plants show the presence of many types of phytochemicals, namely alkaloids, flavonoids, tannins, and saponins that shows the immense effect on reproductive health. This review is a summarized form of many of the scientific proven information about these type of phytochemical constituents

Table 1: List of antifertility plants with chemical constituents

Plant name	Common name	Type of extract	Plant part used	Activities	Chemical constituents	References
1. <i>Abrus precatorius</i>	Chirmi	Methanolic	Seed	Antifertility	Precatorine, trigonelline, choline, abrine abricin, abridin [4]	[3]
2. <i>Acacia catechu</i>	Katha	-	Exudate	Anti-implantation	-	[5]
3. <i>A. leucophloea</i>	Reonja	Alcoholic	Root	Antifertility	Tannins, flavonoids, terpenes, alkaloids [7]	[6]
4. <i>Acacia nilotica</i>	Babul	Aqueous	Pod	Antispermatogetic	Phytosterols, phenolic compounds, saponins [9]	[8]
5. <i>Azadirachta indica</i>	Khokli	Petroleum ether and ethanolic	Whole plant	Post-coital activity	β -Sitosterol, acalyphine, triacetaminine, kaempferol, tannin, stigmasterol [11]	[10]
6. <i>Achyranthus aspera</i>	Chirchira	Ethanolic	Root	Anti-implantation	Ecdysterone [13], oleanolic acid [14], n-hexacos-14-enoic acid [15]	[12]
7. <i>Adathoda vasica</i>	Arusa	-	Leaves	Anti-iplantation	Vasicine [17]	[16]
8. <i>Aegle marmelos</i>	Bael	Ethanolic	Leaves	Antifertility	Alkaloids, caumarins, steroids [19]	[18]
9. <i>Aerva lanata</i>	Bui	Ethanolic	Root	Anti-implantation	Alkaloids, kaempferol, quercetin, β -sitosteryl acetate, tannic acid [21]	[20]
10. <i>Albizia lebbek</i>	Siris	Methanolic	Pod	Spermicidal activity	Lebbekanin-E [23]	[22]
11. <i>Ammanai baccifera</i>	Aginbuti	Ethanolic	Whole plant	Antisteroidogenic	Steroids, triterpenoids, Flavonoids, and tannins [25,26]	[24]
12. <i>Amaranthus spinosus</i>	Kanta chaulai	Acetone	Root	Anti-spermatogenic and anti- androgenic	Alkaloids, flavonoids, saponins, β -sitosterol, stigmasterol, Kaempferol, glycosides [28]	[27]
13. <i>Amaranthu viridis</i>	Jangli cholai	Aqueous	Root	Abortifacient	Alkaloids, anthraquinon, saponins [30]	[29]
14. <i>Anagallis arvensis</i>	Dhartidhak	-	Whole plant	Spermicidal activity	Oleanolic acid [32]	[31]
15. <i>Andrographis paniculate</i>	Kiryat	Dry leaf powder	Leaves	Antispermatogetic	Flavonoids, andrographilode, diterpenoids, phenylpropanoids, oleanolic acid, and β -sitosterol [34]	[33]
16. <i>Aristolochia indica</i>	Indian Birthwort	Ethanolic	Root	Antispermatogetic/ anti-androgenic	Aristolic acid, p-coumric acid, methyl aristolate	[35]
17. <i>Argemone maxicana</i>	Satyanashi	-	Seed	Anti-spermatogenic	Isoquinoline alkaloids, dihydro palmatine hydroxide, berberine, protopine	[36]
18. <i>Azardirachta indica</i>	Neem	Alcoholic	Flower	Antifertility	Steroids, triterpenoids, alkaloids, phenolic compound, flavonoids [38]	[37]
19. <i>Balanites aegyptiaca</i>	Desert date	Methanolic	Bark	Antiimplantation	β -sitosterol, bergaptem, marmesin, β -sitosterol glucoside [40]	[39]
20. <i>Balanites roxburghii</i>	Desert date	Ethanolic	Fruit	Abortifacient	Alkaloids, saponins, tannins, flavonoids, phenolic compound [42]	[41]
21. <i>Bbiophytum sensitivum</i>	Lakshmana	Ethanolic	Whole plant	Antifertility activity	Phenolic and polyphenolic compound, saponins [44]	[43]
22. <i>Boerhavia diffusa</i>	Khapra-ara	Methanolic	Root	Antiimplantation, antiestrogenic	β -sitosterol, alkaloids, ursolic acid [46]	[45]
23. <i>Butea monosperma</i>	Dhak	Petroleum ether and Chloroform Methanolic	Root	Anti-steroidogenic	Glycine, glycoside, aromatic hydroxyl compound [48]	[47]
24. <i>Cajanus cajan (L)</i>	Arhar	Methanolic	Seed	Antifertility	Sitosterol [50]	[49]
25. <i>Calotropis gigantea</i>	Madar	Ethanolic	Root	Anti-implantation	Akundanin, calotropin	[51]
26. <i>Calotropis procera</i>	Aak	Ethanolic	Root	Anti-implantation	Alkaloids, flavonoids, tannins, saponins, and cardiac glycosides [53]	[52]
27. <i>Capparis decidua (aphylla)</i>	Kair	Ethanolic	Whole plant	Antispermatogetic	Capparin, capparinin, capparinin, sitosterol, n-triacontanol	[54,55]

(Contd...)

Table 1: (Continued)

Plant name	Common name	Type of extract	Plant part used	Activities	Chemical constituents	References
28. <i>Cassia fistula</i>	Amaltash	Aqueous	Seed	Anti-estrogenic	Anthraquinone, glycosides, flavonoids, phenolic compound [57]	[56]
29. <i>Cassia occidentalis</i>	Kajondi	Ethanollic	Root	Anti-implantation and abortifacient	β -sitosterol, campesterol [59], emodin, 1,8-dihydroxyanthraquinone, quercetin [60]	[58]
30. <i>Celsia cromandeliana</i>	Kokhima	Methanolic	Arial part	Antiovolatory	-	[61]
31. <i>Convolvulus arvensis</i>	Field bindweed	Alcoholic	Arial part	Antispermatogetic	α -amyrin, campesterol, stigmaterol, β -sitosterol, quercetin, kaemferol, p-caumaric acid [63]	[62]
32. <i>Corchorus olitorius</i>	Nalta jute	Methanolic	Seed	Antisteroidogenic	Hydrocyanin, cardiac glycosides, tannins, flavonoids, anthraquinones, saponins ^[65] Corchoroside A, helveticoside, coroloside, digitoxigenin, periplogenin [66]	[64]
33. <i>Cordia dichotoma</i>	Lasora	Methanolic	Bark	Antiimplantation	α -amyryns, lupeol-3-rhamnoside, β -sitosterol, β -sitosterol-3-glucoside, toxifolin-3,5-dirhmmoside [68]	[67]
34. <i>Crotolaria juncea</i>	Sunnhemp	Petroleum ether, Benzene and ethanol	Seed	Antispermatogetic	Flavonoids, alkaloids, saponins, volatile oil [70]	[69]
35. <i>Cuscuta reflexa</i>	Amarbel	Methamolic	Stem	Anti steroidogeic	Kaemferol-3-o-glucoside quercetin, quercetin-3-0-glucoside [72,73]	[71]
36. <i>Cynodon dactylon</i>	Durva	Aqueous	Whole plant	Anti-implantation	Flavonoids, tannins, phenolic compound [75]	[74]
37. <i>Cyperus rotundus</i>	Nut grass	-	Tuber	Antifertility	Tannins, flavonoids, coumarins, sterols [77]	[76]
38. <i>Dactyloctenium aegypticum</i>	Crowfoot grass	Ethanollic	Whole plant	Antifertility activity	Saponins, flavonoids, tannins, terpenoids, alkaloids [79]	[78]
39. <i>Dalbergia sisso</i>	Seesam	Ethanollic	Stem bark	Anti-spermatogetic	Isoflavones, flavone, β -amyryn, β -sitosterol, stigmaterol [81]	[80]
40. <i>Datura metal</i>	Datura	Acetone	Seed	antifertility	Saponins, flavonoids, tannins, glycosides, alkaloids, terpenoids [83]	[82]
41. <i>Dendrophthoe falcata</i>	Banda	Methanolic	Stem	Depression of spermatogenesis	β -amyryn-6-acetate, oleonic acid, β -sitosterol, stigmaterol [85]	[84]
42. <i>Dolichos biflorus</i>	Kulattha	Acetone	Seed	Anti spermatogetic antiandrogenic	Isoflavone diglycoside, aglycone [86]	[27]
43. <i>Embllica officinalis</i>	Amala	-	Fruit	Abortifacient	-	[87]
44. <i>Feronia limonia</i>	Wood apple	Ethanollic	Fruit pulp	Antispermatogetic	Polyphenols, phytosterols, saponins, tannin, coumarins, Triterpenoids [89-91]	[88]
45. <i>Ficus benghalensis</i>	Bargad	Ethanollic	Leaves	Suppression of the spermatogenesis	Tannins, flavonoids, steroids [93]	[92]
46. <i>Ficus religiosa</i>	Peepal	-	Fruit	Anti-implantation	n-hexadecanoic acid, 9,12-octadecadienoic acid, 9,12,15-octadecatrienoic acid, butyl 9,12,15-octadecatrienoat	[94]
47. <i>Gnaphalium indicum</i>	Cudweed	Ethanollic	Whole plant	Anti-implantation	Luteolin, quercetin, quercetin-3-methyl ether [96]	[95]
48. <i>Grangea maderaspatana</i>	Mukhatari	Flavonoid extract	Whole plant	Anti-implantation	Sesquiterpenoids, γ -gurjunene, terpinyl acetate, hinesol [98]	[97]
49. <i>Ipomoea fistulosa</i>	Pink morning glory	Alcoholic	Plant without root	Postcoital antifertility	Alkaloids, glycosides, phenolics, tannins, phytosterols, flavonoids, saponins [100]	[99]

(Contd...)

Table 1: (Continued)

Plant name	Common name	Type of extract	Plant part used	Activities	Chemical constituents	References
50. <i>Mangifera indica</i>	Mango	Methanolic	Leaves	Antispermato-genic	Saponin, anthraquinone, steroids, tannin, flavonoids [102]	[101]
51. <i>Maytenus emarginate</i>	Kankero	Methanolic	Leaves	Inhibition of spermatogenesis	Tannins, flavonoids, alkaloids, steroids [104]	[103]
52. <i>Melia azedarach</i>	Chinaberry	-	Seed	Abortifacient	Alkaloids, tannins, saponins, phenols, glycosides, steroids, terpenoids, flavonoids [106]	[105]
53. <i>Mimosa pudica</i>	Touch me not	-	Root	Contraception and abortion	Alkaloids, glycosides, steroids, flavonoids, phenols [110]	[107-109]
54. <i>Nelumbo nucifera</i>	Lotus	Ethanolic	Seed	Anti-estrogenic	Alkaloids, flavonoids, ursane triterpenoid ester [112,113]	[111]
55. <i>Nyctanthes arbortristis</i>	Har singar	Methanolic	Stem bark	Antispermato-genic	Alkaloid, phytosterols, phenolics, tannins, flavonoids, saponins [115]	[114]
56. <i>Ocimum basilicum</i>	Shyam Tulsi	Hydroalcoholic	Leaves	Antifertility	Saponins, glucosides, alkaloids, tannins, and phenolic compounds [117]	[116]
57. <i>Opuntia dillenii</i>	Naagfani	Methanolic	Phylloclade	Antispermato-genic	Vitexin, isorhamnetin	[118]
58. <i>Purgularia deamia</i>	Sagovani	Ethanolic	Stem, leaves	Antifertility	Flavonoids, terpenoids, steroids, alkaloids [120]	[119]
59. <i>Polygonum glabrum</i>	Neli	-	Root	Contraceptive	Sterol [121]	[87]
60. <i>Portulaca oleracea</i>	Purslane	Petroleum ether, chloroform, and ethanol crude	Arial part	Abortifacient	Alkaloids, tannins, flavonoids, saponins, and triterpenoids [123]	[122]
61. <i>Rivea hypocrateriform</i>	Night glory	Ethanolic	Arial part	Antiovu-latory	Alkaloids, glycosides, saponins, tannins, phenolic compound [125]	[124]
62. <i>Salvadora persic</i>	Meswak	Aqueous	Leaf and stem	Antifertility	Octacosanol, 1-triacantanol, β -sitosterol, β -sitosterol-3-o- β -D-glycopyranoside [127]	[126]
63. <i>Sida acuta</i>	common wireweed	Ethanolic	Leaf	Antiimplantation	Alkaloids, steroids, glycosides, saponins, flavones, phenolic compound	[128]
64. <i>Syzygium cumini</i>	Jamun	Alcoholic	Seed	Antispermato-genic	β -pinene, terpinolene, eugenol ^[130] rutin, quercetin ^[131] β -sitosterol [132]	[129]
65. <i>Terminalia bellirica</i>	Harad	Ethanolic	Bark	Anti-implantation	Phytosterols, flavonoids, phenolic comp., tannins [134]	[133]
66. <i>Terminalia chebula</i>	Harad	Acetone, Methanol, Ethanol, Aqueous	Bark	Antispermato-genic	Tannins, flavonoids, sterols ^l ^{136]} triterpenoids [137]	[135]
67. <i>Tactona grandis</i>	Teak	Petroleum ether	Stem	Antifertility	Lapachol	[138]
68. <i>Tamarindus indica</i>	Imli	-	Fruit	abortifacient	-	[27]
69. <i>Tephrosia purpurea</i>	Unhali	-	Seed	Purpurin, rutin	-	[139]
70. <i>Terminalia arjuna</i>	Arjun tree	-	Bark	Antiimplantation, Abortifacient	Lupeol, oleanolic acid, arjunic acid, arjunetin, arjunolitin [141]	[140]
71. <i>Tinospora cordifolia</i>	Giloya	Methanolic	Stem	Antifertility	Alkaloids, sesquiterpenoid, β -sitosterol, cordifolia, columbin [143,144]	[142]
72. <i>Tribulus terrestris</i>	Gokhru	-	Seed	Abortifacient	Alkaloids, flavonoids, saponins, tannins [145]	[75]
73. <i>Vicoa indica</i>	Banjhauri	-	Plant	Antiimplantation	Vicolid B, Vicolid D	[146]
74. <i>Wrightia tinctorial</i>	Duhi	Ethanolic	Stem bark	Post-coital interceptive avtivity	Lupeol, stigmasterol, campesterol [148]	[147]
75. <i>Zizyphus mauritiana</i>	Ber	Aqueous, methanolic	Bark	Spermicidal	Mauritine A, B, oleonic acid, betulonic acid [150]	[149]

and their antifertility activity found in some medicinal plants present in Chambal riverine area.

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CONFLICTS OF INTERSET

Declared none.

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