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REVIEW ARTICLE

Lodhra- A Single Remedy For Different Ailments

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ABSTRACT

Lodhra, a common indigenous drug, mentioned in Ayurvedic classics as a remedy for various human ailments. This tree possesses a wide range of ethno medicinal uses including treatment for diarrhoea, dysentery, bowel complains, vaginal discharges, abortion and snake bite etc. In today's world every one has main focus on herbal drugs as these have huge potential for treating many human disorders, without causing any adverse effect or having very less side efects. The focus of the article is mainly concerned with pharmacotherapeutics of various metabolites of *Symplocos* and its species which are used as a substitute of *Lodhra*.

Key words: Lodhra, *Symplocos*, Phytochemistry, Ayurvedic Importance, Pharmacological Actions, Indian Medicine.

INTRODUCTION

Ayurveda, the oldest medical science of the Indian Subcontinent, been practised since 1000 B.C. with objectives to accomplish physical, mental, social and spiritual well being by adopting, health promoting holistic approach towards life [1]. Today's contemperory era,main emphasis is given on plant researches as a large evidence has been available to show the huge potential of medicinal plants used in various traditional systems [2].

In sanskrit *"lodhra"* means *'Propitious'& 'Tilaka'*, as the bark of the tree was used in making the *Tilaka* mark on the forehead, the plant is named as *Lodhra* [3]. In Europe, it was formerly known as a Cinchona bark and had been known at various time as *"Encorce de lautour"*, *"China nova"& "China paraquatan"* [4]. At present time there are different types of other spieces which are marketed as *lodhra* as the unavailability of same drug has forced the practitioner to practice with the substitute drug. In Many of the traditional systems, one common vernacular name have been used for plants of different speices leading to adultration or accidental misuse of the plant [5]. This review article, mainly concerned with pharmacological actions of various metabolites of *Symplocos* and its various species which are used and marketed as a *Lodhra* .

Taxonomical Hierarchy of different species marketed as Lodhra [6]

Taxonomical hierarchy	*Symplocos racemosa*	*Symplocos paniculata*	*Symplocos sumuntia*	*Symplocos cochinchinensis*
Kingdom	Plantae	Plantae	Plantae	Plantae
Sub-kingdom	Tracheobionta	Tracheobionta	Tracheobionta	Tracheobionta
Super-division	Spermatophyta	Spermatophyta	Spermatophyta	Spermatophyta
Division	Magnoliophyta	Magnoliophyta	Magnoliophyta	Magnoliophyta
Class	Magnoliopsida	Magnoliopsida	Magnoliopsida	Magnoliopsida
Subclass	Asteridae	Asteridae	Asteridae	Asteridae
Order	Ericales	Ericales	Ericales	Ericales
Family	Symplocaceae	Symplocaceae	Symplocaceae	Symplocaceae
Genus	Symplocos	Symplocos	Symplocos	Symplocos
Species	*racemosa* Roxb.	*paniculata* Miq.	*sumuntia* Buch. Ham exD. Don	*cochinchinensis* (Lour.)S.Moore

PHYTO CHEMISTRY:

Flavanol glucosides: Symplocoside, Symposide, Leucopelargonidin 3-Glucoside, Ellagic Acid.
Flavanol Glycosides: Rhamnetin 3-Galactoside.

BARK consists of:

Triterpenoids: 19 A-Hydroxyarjunolic Acid-3, 28-O-Bis-B-Glucopyranosides, 19 A-Hydroxyasiatic Acid-3, Betulin, Oleanolic Acid, B-

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Sitosterol & A-Amyrin [7,9]. 28-Hydroxy-20α-Urs-12, 18(19)-Dien-3β-Yl Acetate, 3-Oxo-Urs-20α-12, 18(19)-Dien-28-Oic Acid & 24-Hydroxyolean-12-En-3-One [8].

Alkaloids: Loturine, Isoloturine & Harmane [10].

Phenolic Glycosides: Benzoylsalireposide [11], Symconoside A & Symconoside B [12], Symplocuronic Acid & Sympocernoside [13]; 3,5-Dihydroxy-2-(Hydroxyl Methyl)-6-(3,4,5-Trimethoxy Phenoxy)Tetrahydro-2h-Pyran-4-Yl, 4-Hydroxy-3-Methoxy Benzoate [14].

Ethyl Substituted Glycosides: Ketochaulmoogric Acid, Nonaeicosanol, Triacontyl Palmitate, Methyl Triacontanoate and one new 1-Ethylbrachiose-3´-Acetate [15].

C-glycoside: symcososide [16], sito-glycoside.

Benzyl derivative: locoracemosides A, B &C [17].

AYUREDIC IMPORTANCE OF LODHRA:

	Disease	Formulation forms	References
1	**Eye Diseases**		
a)	Disorders of lids	Shewta *Lodhra* kalka+ butter.	A.H.Utt.9/11-12.
b)	Corneal ulcer	*Lodhra*- pouch sprinkling dipped in tepid water.	A.H Utt.11/38.
c)	Conjunctivitis	*Lodhra +Madhuka* powder fried in ghee; softened with breast-milk and kept in cloth.	A.H.Utt.14/16.
d)	*SuÒkÁkÒipÁka*	Shewta *Lodhra* powder ghrita fried, kept in a cloth-pouch; mixed with hot water and sprinkled.	A. H.Utt.16/32.
e)	Burning, Itching and Pain	*Lodhra* powder ghrita fried+rocksalt + sour gruel and pounded; kept in cloth piece and used as eye drops.	V.M.61/36.
f)	*Pitta*, *Rakta* and *VÁta* eye disease	*Lodhra* bark pieces wrapped in *Nimba* leaves +heated on fire ; then powdered.	V.M.61/ 39-41.
g)	Whole eye disease	*ÏÁbara Lodhra* powder ghrita fried applied as lepa on lid.	C. S.Chi.26/233, Chakradatta 59/11.
2.	**Acne & Pimples**		
	Acne	*Lodhra+ SphaÔikÁ* kalka .	A. S.Utt. 37/5.
	Pimples	*Lodhra+ DhÁnyaka+ VacÁ* kalka.	V.M.57/43.
		Lodhra+Marica+Gorocana as face cream.	V.M.57/43 .
3.	***KuÐtha***	*Lodhra+ DhÁtakÍ+Indrayava+Karañja +JÁti* powder used for rubbing as well as for applying as lepa .	C.S.Chi.7/ 95 .
4.	**Dysentry**	*Lodhra* powder+curd.	B.P.Chi.2/120.
5.	**Wound**		
	Healing	*DhÁtakÍ + Lodhra* powder.	C.S.Chi.25/67-68.
	Loosening & Softening	*Lodhra+Nyagrodha* bud+*Khadira+TriphalÁ+Ghéta* paste	C.S.Chi.25/110.
6.	**Haemorrhage**		
	Extrinsic	*Lodhra* powder applied externally as haemostatic.	S.S.Su.14/36.
	Intrinsic	*Lodhra* powder as effective drug for checking haemorrhage.	C.S.Chi.4/73.
7.	**Leucorrhoea**	*Lodhra* kalka+ Kwath of *Nygrodha* bark.	C.S.30/118.
8.	**Diseases of women**		
	Normal foetal movement	In 8th month *Lodhra+PippalÍ* +honey taken with milk.	H.S.Tri.50/5.
	Maintaining vaginal shape	*Tumbi* leaves+*Lodhra* in equal parts ; applied as paste.	B.P.M.Kh.70/128.
	Various women's disorders	*LodhrÁsava* as one of the important formulation.	A.H.Chi.12/25-28.

AYURVEDIC FORMULATIONS:

S. No.	Formulation containing *Lodhra* as an ingredient	Indications (Rogadhikar)	References
1	*Rodhrasava (lodhrasava)*	*Prameha*	G.N.Prameha/42-45; A.H.Chi.12/25-28 .
2	*Pushyanuga churna*	*Yonivyapata, stri roga*	C.S.Chi.30/90-95; A.H.Utt.36/45-49; V.S.Stri./51-56; Y.R.68/31-36, Chak.61/15-20; B.R.66/25-30.
3	*Gangadhar churna*	*Atisaar*	G.N.2/59-60, B.P.Chi.2/31, B.R.6/43-45.
4	*Dashmualrista*	*Vajikarana*	B.R.74/357-371; G.N.Asa./251-265; Sh.S.M.Kh.10/77-92.
5	*Bhringraja taila*	*Kshudra roga*	B.R.60/130-135; G.N.Taila./221-228; V.M.Kshudra./104-105
6	*Jatyadi taila*	*Upadansa, mukharoga*	Y.R.63/123; V.S.59/42-45; B.P.66/60-6; Sh.S.M.Kh.9/169-172; B.R.47/64-67.
7	*Jivantyadi ghrita*	*Netra roga(timir roga)*	G.N.Ghrit.317-318; A.H.Utt.22/90-94.
8	*Khadiradi gutika*	*Mukha Roga*	C.S.Chi26/206-214 ; A.H.Utt.13/2-3 .
9	*Pippalayarishta*	*Sangrahni,pandu, arsha etc*	G.N.Asava./94-98;Y.R.11/160-163; B.R.6/611-615 ; Sh.S.M.Kh.10/28-33.
10	*Somnath rasa*	*Pradara*	B.R.86/24-27; S.S.3/6-9; Bri. R.R.S. Somroga /6-9 ; R.Chin.Bahumutra./14-17.
11	*Vidangaristha*	*Prameha*	G.N.Asava.37-41; B.R.37/19 ; Y.R.47/73; Sh.S.M.Kh.10/47-52 .

Lodhra is *sheeta virya* , *laghu* and hasbeen used as *netra hitkara* & *rakta dosha nashaka*. Due to its *pitta* and *kapha dosha* pacifying activities i.e., it mitigates vitiated forces (*doshas*) of body. It is also helpful in cleaning of wound, holds bleeding & initiates fast healing process. *Lodhra* also used to treat gastrointestinal disorders as it is acrid, digesting & astringent to bowels. Due to its *grahi* (anti- diarrheal) property it is commonly used to treat *Atisara* (diarrhoea). It reduces fever & cures the spongy gum bleeding, skin diseases (such as leprosy), dropsy and liver complaints. *Lodhra* is a drug of choice in the treatment of gynaecological disorders, menorrhagia, leucorrhea (excessive discharge from vagina) & other menstrual disorders. It is also useful in abortions & miscarriages & ulcers for vagina[18]. All these properties have made *Lodhra* an important herb to treat various disease ailments related to mankind. The bark has astringent, styptic, cooling, anti-inflammatory & anti- microbial properties and is used in various Ayurvedic formulations for the management of excessive vaginal discharge. Scientific studies have shown that *Lodhra* has inhibitory effects on growth of *micrococcus Pyogenes var. aureus*, *E.coli*, enteric groups of micro organisms [19].

PHARMACOLOGICAL ACTION OF DIFFERNT VARIETIES OF LODHRA

Anti- androgenic effect: *S. racemosa* treatment significantly decreased testosterone level which was found to be elevated in PCOS rats induced by letrozole. It significantly restored other blood biochemical parameters such as estrogens, progesterone and cholesterol level. It also restored the histology of ovarian tissue. The ovarian weights and uterine weights were also significantly improved after treatment [20].

The in vivo effect of aq. extract of *S. racemosa* on serum FSH and LH levels in immature female Sprague-Dawley rats on oral administration significantly stimulated serum FSH level along with rise in serum LH level. Moreover histological studies revealed enhanced folliculogenesis, presence of mature follicles and detached oocytes, which are result of increased FSH and LH levels. Further, an increase in the ovary weight of treated animals was found due to observed FSH surge [21].

Anti- cancer activity: Effects of chloroform, butanol and ethyl acetate extract of *S. racemosa* bark (test) and cyclophosphamide (control) on the growth of Hela and HL60 cells lines were examined by the XIT assay. The highest cytotoxicity of butanol extract was found against HeLa cell line, which is more potent than that of cyclophosphamide, which shows that the extract was proven more active against the HeLa than the cyclophosphamide, while in case of ethyl acetate extract the highest cytotoxicity was found against HL 60 line [22]. In pharmacological screening the cytotoxic activity of EESR (ethanolic extract of *S. racemosa*) using 3 human cancer cell lines [i.e. Breast Cancer (MCF7), Colon Cancer (HT29), Liver Cancer (HepG2)] were evaluated with MTT assay method. The result of EESR showed potent cytotoxic effect on HT29 cell line, moderate in MCF7 cell line and less cytotoxic effect on the HepG2 cell line [23].

Antibacterial Activity- Ethanolic extract of *S. racemosa* Roxb shows good antibacterial activity as compared to pertroleum ether, but it has poor antibacterial activity against gram negative microorganism like *P. aeruginosa* and *E.* Coli [24]. Methanolic extracts of leaves, root and stem barks of *S. cochinchinensis* and their fractions obtained by partition (petrol, dichloromethane and ethyl acetate) were screened for antimicrobial activity. All crude extracts and fractions showed a broad spectrum of antibacterial activity that was enhanced on fractionation [25].

Antidiabetic effect: Hexane extract of *S. cochinchinensis* leaves has potential of anti diabetic property to treat type 2 diabetes[83] and its bark methanolic extract (SCBe) in streptozotocin (STZ) induced diabetic rats, shows significant decrease in plasma insulin and liver glycogen levels in treated diabetic rats [26].

Antihelmintic effect: The anthelmintic activity of petroleum ether, chloroform and ethanol extract of bark *S. racemosa* on adult Indian earthworms. This reveals that the ethnolic extract had more anthelmintic property as compared to other extract [27].

Anti inflammatory activity: Methanol extract of leaves *S. cochinchnensis* Lour ssp laurina have effective in-vitro anti-inflammatory activity so it was selected for in vivo anti-inflammatory activity by carrageenan induced paw edema models in rats. The extract showed significant anti-inflammatory activity (53%) at the dose of 400mg/ml. On the basis of the above results it can be concluded that the methanol extract posses

significant anti-inflammatory activity studied by in vitro and in vivo models [28].

Anti-oxidant activity: The methanol extract of *S. cochinchinensis* S. Moore leaves showed very good scavenging activity on 2,2-diphenyl-picrylhydrazyl (DPPH), hydroxyl, nitric oxide radicals ,as well as high reducing power. The extract also showed strong suppressive effect on lipid per-oxidation [29].

Anti ulcer activity: The aqueous and ethanolic extracts of *S. racemosa* for anti-ulcer activity in pylorus ligation and aspirin induced models, the acute toxicity study for aqueous and ethanolic extracts indicates that they are safe upto 2000mg/kg body weight and was selected 1/8th and 1/4th of 2000mg/kg i.e.250mg/kg and 500mg/kg respectively as per fixed dose procedure. At 500mg/kg aqueous and ethanolic extracts has reduced ulcer index more significantly than 250mg/kg when compared with the control as evident by decrease in ulcer score in both the models (pylorus ligation and aspirin induced). Anti-secretory activity (decrease in gastric volume) and reduction in free and total acidity of the extracts at500mg/kg was noticed in pylorus ligation induced ulcer model [30].

Hypolipidemic activity: An evidence of participation of oxidative stress in hyperlipidemia: Hypolipidemic activities of ethanolic extracts of *S. racemosa* (ESSR) were studied by triton-WR1339 (acute) and high fat diet induced (chronic) hyperlipidemic rat models. In both the models, a significant increase in total cholesterol (TC), triglycerides (TG), very low density lipoproteins (VLDL), low density lipoproteins (LDL) and decrease in high lipoproteins (HDL) in serum were observed. ESSR (200 & 400mg/kg) and simavastatin (10mg/kg) administered orally reduced the elevated serum lipids (TC, TG, VLDL, LDL), restored the decreased HDL and improved the atherogenic index. In high fat diet induced hyperlipidemic model, ESSR treatment prevented the increased formation of malondialdehyde (MDA) in liver, restored the depleted liver antioxidants, glutathione, superoxide dismutase, catalase significantly. The increased liver cholesterol, HMG-CoA reductase activity and body weight of hyperlipidemic rats were significantly reduced by ESSR treatment. The ESSR HMG-CoA reductase activity is a rate limiting enzyme in cholesterol biosynthesis, thereby causing hypolipidemic effects. ESSR treatment also improved histoarchitecture of hepatocytes in hyperlipidemic rats. The hypolipidemic activity of ESSR may be due to presence of flavonoids phenolic compounds, phenolic glycosides and steroids [31]. *S. cochinchinensis* bark methanolic extract (SCBe) SCBe showed antilipidemic activity as evidenced by significant decrease in serum TC, TG, LDL-C levels and significant increase in HDL-C level in treated diabetic rats. SCBe also restored the altered plasma enzymes (SGOT, SGPT and ALP), total protein, urea and creatinine levels to near normal [32].

Anti acne effect: Ethanolic extracts of *S. racemosa* bark shows anti acne activity with the help of disc diffusion and dilution methods [33].

Anti-angiogenic activity: Symplocomoside and symponoside, glycosides isolated from bark of *S. racemosa* inhibit Thymidine Phosphorylase (TP) activity and associated angiogenesis [34].

Alzheimer's disease: 3 new benzyl derivatives; locoracemosides A, Band C from n-butanol soluble extract from bark of *S. racemosa* showing in vitro inhibitory activity against α-chymotrypsin [36].

Hepatoprotective activity: Ethanolic extract of bark of *S. racemosa* showed significant dose-dependent restoration of serum enzymes, bilirubin, albumin,total proteins and antioxidant levels against carbon tetrachloride induced hepatic damage in rats. Notable improvements were observed morphologically and histopathologically. So it has potency in treating liver disorders [37].

Lipoxygenase and urease inhibitory activity: These enzymes promote the development of kidney stones, polynephritis, peptic ulcer disease etc. The activity of 1-ethyl brachiose-3´-acetate along with four known compounds ketochaulmoogric acid, nonaeicosanol, triacontyl palmitate and methyl triacontanoate using in vitro lipoxygenase and urease inhibition assay. The result showed that 1-ethyl brachiose-3´-acetate and triacontyl palmitate displayed the inhibitory potential against lipoxygenase and urease enzyme [38]. Triacontanyl palmitate isolated from n-hexane soluble fraction of bark of *S. racemosa* and investigated the urease inhibitory activity by urease inhibition assay. Triacontanyl palmitate inhibited the urease enzymes in a concentration-dependent manner [39].

Phosphodiesterase, thymidine phosphorylase and butyrylcholinesterase inhibiting activity-

Benzoyl salireposide and salireposide isolated from *S. racemosa* inhibited phosphodiesterase 1 activity [40]. Benzoyl salireposide and salireposide isolated from *S. racemosa* have phosphodiesterase -1 inhibitory activity. They had taken the phosphodiesterase -1 enzyme from snake venom and human nucleotide pyrophosphatase phosphodiesterase 1 [41].

Symplocomoside, symponoside, symplososide, symploveroside, benzoylsalireposide, and salireposide have phosphodiesterse and thymidine phosphorylase inhibiting activities [42].
butyrylcholinestrase inhibitory activity of symcososide was isolated from bark of *Symplocos racemosa* [43] .

PRECAUTIONS & SAFETY ASPECTS: [44]

1. It is advisable to diagnose the cause of leucorrhea before starting treatment with *Lodhra*.
2. Overdose & empty stomach consumption of *Lodhra* powder may cause abdominal heaviness, nausea & constipation in individuals prone to gastrointestinal upsets. These symptoms can be avoided by taking light or liquid diet.
3. Decoction of *Lodhra* bark for vaginal wash should be prepared fresh & should not be left uncovered for long time. It is better to use the decoction within an hour or so of preparation.
4. A smaller dose of *Lodhra* powder may be taken, if menstrual flow gets diminished.
5. Excessive use of spicy and sour food items, curd, and yogurt should be avoided during medication. Mental stress aggravates the symptoms of leucorrhea and hence an attempt should be made to remain stress-free, relaxed & physically active. If significant control of symptoms is not achieved in three or four weeks medical opinion must be sought.
6. No adverse effect of *Lodhra* powder is reported when taken in recommended doses.
7. It is safer for the baby if a nursing mother is taking this medication. However, *Lodhra* powder should not be used for a long duration during pregnancy.

SUMMARY AND CONCLUSION

All the researches done on *lodhra* and its varients shows that it has large numbers of active metabolites which supports that it can be used in large number of disorders. It has been tried to give an elaborated description of this tree so that it might be helpful to provide evidenced based treatment. In Ayurvedic texts, *lodhra* has been elaborated in detail due to its *pitta dosha* and *kapha dosha* pacifying activities. *Lodhra* cleans the wound, arrests bleeding & initiates fast healing process of wound. Due to the *rodhaka* (arresting) property of plant, it is also called *Rodhra*. Since thousands of years, *lodhra* has been used safely to treat gastrointestinal disorders due to its *grahi*(anti- diarrheal) property as in *Atisara*(diarrhea). *Lodhra* is *sheeta virya, laghu, netra hitkara* & *rakta dosha nashaka*. It is useful to treat skin diseases (such as leprosy), dropsy & liver complaints. It has been considered as drug of choice in the treatment of gynaecological disorders. *Lodhra* has been used to cure the menorrhagia, leucorrhoea (excessive discharge from vagina) & other menstrual disorders. It is also useful in abortions & miscarriages & ulcers for vagina.

The bark of this tree has astringent, styptic, cooling, anti-inflammatory & anti- microbial properties & is used in various Ayurvedic formulations meant for the management of many disorders specially in gynaecological disorders. Scientific studies have shown that *lodhra* has an inhibitory effect on growth of *micrococcus Pyogenes var. aureus, E.coli*, enteric groups of micro organisms. The phytochemical variations and efficacy of the medicinal values of any plant dependent's on its geographical disrribution and seasons variation. The correct identification of plant, diagnosis of disease and the judicious use of plant or its part is only the need for serving the mankind.

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