



Research Article

REVERSE PHARMACOLOGICAL CORRELATIONS OF LESSER KNOWN HERBS POTENTIALLY USED AS FOLK-MEDICINE BY JAUNSARI TRIBE

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ABSTRACT

The present study aims to scientifically validate folk claims of lesser known herbs potentially used as folk-medicine by Jaunsari tribe based on the principles of Reverse Pharmacology. From ancient times various ethnic communities used herbs as medicine. As the scientific inventions and people's need succeeded hundreds of active ingredients isolated from herbs to use them as medication. The present work has been carried out on the lesser known herbs potentially used as folk medicine by Jaunsari tribe. Approximately 63 lesser known herbs were identified from Jaunsari tribe potentially used as folk remedy, for their Reverse Pharmacological correlations with scientific in-vivo, in-vitro and clinical studies. The Jaunsari people use various lesser known herbs like *Anagallis arvensis* L. *Anemone obtusiloba* D. Don, *Anemone vitifolia* Buch.-Ham. ex DC., *Arisaema jacquemontii* Blume, *Coriaria nepalensis* Wall., *Cotoneaster microphyllus* Wall ex Lindl., *Cynoglossum zeylanicum* Thunb., *Rubus niveus* Thunb., *Rumex hastatus* D. Don, *Sarcococca saligna* Meull-Arg., *Siegesbeckia orientalis* Linn. etc. for curing different ailments i.e. healing wounds, fever, abdominal pain, cough, urinary disorders, asthma, snake-bite, skin disorders, nervous disorders, arthritis, piles, diarrhea, dysentery, headache, malaria, diabetes, jaundice, tuberculosis, renal disorders etc. The ancient folk medicinal wisdom of Jaunsari tribes can be explored for new drug discovery and development. There are insufficient research data on evaluation and validation and Reverse Pharmacological correlation of folk medicinal wisdom of various tribe groups, particularly on the parameters of modern scientific techniques. There is a need for corroboration of various disciplines like ethno-botany, folk-medicine, traditional medicine, Ayurveda, chemistry, modern pharmacology for authentic exploration and validation of these wisdom. This multi-disciplinary approach of Reverse Pharmacology may lead to new innovations and development of new natural drugs and their derivatives.

KEYWORDS: Reverse Pharmacology, Lesser Known Herbs, Folk-lore, Folk Medicine, Jaunsari Tribe.

INTRODUCTION

From ancient times various ethnic communities used herbs for medicine. As the scientific inventions and people's need succeeded hundreds of active ingredients isolated from herbs to use them as medication. The succession of various deadly ailments and need of easily available medical treatments allows recent advances in the technology used in new drug development. In the early phase of developments of pharmaceuticals and pharmacology, most of the drugs were formed using actives of medicinal herbs. In this context new techniques and technology may well speed the development of innovative drugs for many currently untreatable diseases [1].

Reverse Pharmacology is a discipline of medical science of integrating documented experiential hits, into leads by trans-disciplinary exploratory studies and further developing into new drugs by experimental research. It will enhance the connection, communication and collaboration between modern sciences and technology with traditional and folk-medicine [2]. The drug discovery through natural products heavily involves the utilization of Reverse Pharmacology [3, 4]. Natural products are screened against targets of

known physiological action in order to determine their functional activity.

Natural products screening begins with re-examination of ancient folk remedies that have been stated to cause the desired physiological effect but have not been proven or scientifically tested [5]. *Rauwolfia serpentina*, commonly known as *Sarpagandha* or *Pagal Buti* used in *Ayurveda* and Tribal communities for neuro-psychiatric disorders was the first traditionally inspired new drug discovery to modern pharmaco-therapeutics as anti-hypertensive. This was the first example of acquiring Reverse Pharmacology, by isolating reserpine alkaloid as an anti-psychotic and anti-hypertensive, in new drug development.

Folk-medicine is widely used form of alternative medical practices among tribes of India including Jaunsari Tribes [6]. The Folk-medicine particularly as ethnomedicinal plants used by Jaunsari tribe in Jaunsar-Bhawal region has great medicinal plant-lore [7]. There are hundreds of plant species used as medicine for the treatment of various diseases and disorders by the tribal community.

MATERIAL AND METHODS

The present work has been carried out on the lesser known herbs potentially used as folk medicine by Jaunsari tribe, inhabitants in the Uttarakhand state of India particularly in the district of Dehradun. The region is under the Shivalik and Himalayan mountainous chain. Medicinal plants and data of their folk claims was recorded involving interviews, semi-structured meetings, group discussions and reviews of various research literatures published. The lesser known herbs were identified on the basis of less or nil description of herbs or their specific folk claims. Approximately 63 lesser known herbs were identified from

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Jaunsari tribe potentially used as folk remedy, for their Reverse Pharmacological correlations with scientific in-vivo, in-vitro and clinical studies. The data presented in the present study delineated with botanical name, family, folk uses and their Reverse Pharmacological correlates with authentic reference citation. The research work towards enumeration of plants is based on earlier published data along with documentations and communications under present studies.

RESULTS AND DISCUSSION

There are more than 170 herbs used as folk-medicine for the treatment of various diseases and disorders by the *Jaunsari* tribal community. In the present study a number of 63 medicinal plants were identified and an authentic correlation is established with modern scientific researches involving principles of Reverse Pharmacology. The botanical name of the plants along with their family, vernacular names, folk claims by the tribal people in the study area and Reverse Pharmacological correlates is presented [Table 1].

The *Jaunsari* tribal people use various lesser known herbs like *Anagallis arvensis* L. *Anemone obtusiloba* D. Don, *Anemone vitifolia* Buch.-Ham. ex DC., *Arisaema jacquemontii* Blume, *Coriaria nepalensis* Wall., *Cotoneaster microphyllus* Wall ex Lindl., *Cynoglossum zeylanicum* Thunb., *Rubus niveus* Thunb., *Rumex hastatus* D. Don, *Sarococca saligna* Meull-Arg., *Siegesbeckia orientalis* Linn. etc. for curing different ailments i.e. healing wounds, fever, abdominal pain, cough, urinary disorders, asthma, snake-bite, skin disorders, nervous disorders, arthritis, piles, diarrhea, dysentery, headache, malaria, diabetes, jaundice, tuberculosis, renal disorders etc.

A respective folk claim of the lesser known herbs is identified and validation and Reverse Pharmacological correlation is established by authentic research data. For example *Ajuga bracteosa* Wall ex Benth. is potentially used as folk remedy for arthritis and ear-ache, on the other hand the similar therapeutic effects were validated by scientific studies using reverse pharmacological principles. It shows exhibited better anti-arthritic activity than the standard aspirin ^[11]. In another study *Ajuga bracteosa* at the doses used (200 and 400 mg/kg, i.p.) chloroform and water extracts showed significant and dose-dependent analgesic effects ^[12].

Table No. : 1 Reverse Pharmacological Correlates of Lesser Known Herbs

Botanical Name	Family	Common Name	Folk Claims	Reverse Pharmacological Correlates	References
<i>Abies pindrow</i> Royle ex D. Don	Pinaceae	Morinda	Wounds, Bodyache	Anti-inflammatory, Analgesic, Anti-ulcerogenic Effects ^[8]	Singh et al., 1998
<i>Ageratum conyzoides</i> Linn.	Asteraceae	Gundrya/ Podina	Wounds	Antibacterial Activity ^[9]	Garg et al., 2015
<i>Ainslaea aptera</i> DC. Syn <i>Ainslaea pteropoda</i> DC	Asteraceae	Karu	Gastric Problems, Bodyache, Fever, Urinary Inflammation, Pneumonia	Anti-inflammatory Activities ^[10]	Chen X et al., 2015
<i>Ajuga bracteosa</i> Wall ex Benth. Syn <i>Ajuga brachystemon</i> Maxim.	Lamiaceae	Nilkanthi, Kadwipatti	Dermatitis, Malaria, Snake-Bite, Ear-ache, Arthritis	Anti-arthritic effects ^[11] Analgesic Activity ^[12]	Kaithwas et al., 2012 Pal et al., 2011
<i>Ajuga parviflora</i> Wall syn <i>Leucas lanata</i>	Lamiaceae	Bishkopara	Fever, Headache, Cough	Antimicrobial, Antioxidant and Wound Healing ^[13] Anti-epileptic ^[14]	Dixit et al., 2015 Ramalingam et al., 2013
<i>Anagallis arvensis</i> L.	Primulaceae	Jonkmari	Wounds, Dermatitis	Antimicrobial , Anti-inflammatory Activity ^[15]	Lopez et al., 2011
<i>Anemone obtusiloba</i> D. Don	Ranunculaceae	Kanchphool	Diarrhoea	Antimicrobial Potential ^[16]	Kaushik et al., 2016
<i>Anemone vitifolia</i> Buch.-Ham. ex DC.	Ranunculaceae	Mudeela	Ringworm, Eczema	Anti-Proliferative Effect ^[17]	Changcai et al., 2017
<i>Arisaema jacquemontii</i> Blume	Araceae	Khaprya/Saperi mausi	Poisonous Mushrooms and Snake Bite	Immuno-modulatory, Antiliashmanial and Phytotoxic Activities ^[18]	Tanveer et al., 2014
<i>Arisaema tortuosum</i> (Wall.) Schott.	Araceae	Chhamboos/Bag mungri	Snake Bite	Anticancer Activity ^[19]	Dhuna et al., 2005
<i>Artemisia nilgirica</i> (C.B. Clarke) Pamp Syn. <i>A. vulgaris</i> auct non Linn., <i>Artemisia indica</i> Willd.	Asteraceae	Chhamboor/ Chhamra	Malaria, Wounds, Headache, Stomachache	Anti-malarial Effects ^[20] Anti-protozoal Effect ^[21]	Chanphen R, 1998; Deniz Tasdemir, 2015
<i>Asclepias curassavica</i> Linn.	Asclepiadaceae	Kahwa, Kauhwa	Constipation, Piles	Purgative Properties ^[22]	Ali Esmail Al-Snafi., 2015
<i>Berberis chitria</i> Edwards	Berberidaceae	Kingore/Chotar	Jaundice, Ophthalmic Problems	Hepato-protective ^[23]	Gilani et al., 2006
<i>Bistorta amplexicaulis</i> Greene Syn <i>Persicaria amplexicaulis</i> (D. Don), <i>Polygonum amplexicaulis</i> (D. Don) 1825	Polygonaceae	Ninai	Earache, Acne	Tyrosinase Inhibition Activity (Anti-acne) ^[24]	Ahmad et al., 2013
<i>Boehmeria platyphylla</i> D. Don	Urticaceae	Chauna	Wounds	Anti-bacterial Activity ^[25]	Djeussi et al., 2016
<i>Boehmeria rugulosa</i> Wedd.	Urticaceae	Gitti, Genthi, Genti, Ghenti	Bone fracture	Anti-bacterial Activity, Antibiotic-Modulation Activity ^[25]	Djeussi et al., 2016
<i>Boeninghausenia albiflora</i> (Hook.) Reichb. Syn. <i>Ruta albiflora</i> Hook.	Rutaceae	Pissodi, Pissumar	Pissumar (Anti-Flea: An external parasite of domestic animals)	Insecticidal Properties ^[26]	Sharma R, et al., 2006

<i>Cardamine impatiens</i> L.	Brassicaceae	Ban-Laiyya	Fever	Anti-oxidative Activity ^[27]	Keima Abe et al, 2017
<i>Carduus nutans</i> Linn.	Asteraceae	Bhushiand, Bushiand	Boils, Sprains, Inflammation	Anti-oxidative Activity ^[28]	Dimitrova-Dylgerova et al, 2015
<i>Celtris australis</i> L.	Ulmaceae	Khairk	Sprains, Arthritis, Pimples	Antifungal Activity (Pimples) ^[29]	Ajda ota et al., 2017
<i>Clinopodium umbrosum</i> (M. Bieb.) C. Koch <i>Syn. Calamintha umbrosa</i> (M. Bieb.) Fisch & Mey.; <i>Melissa umbrosa</i> M. Bieb.	Lamiaceae	Barikura	Wounds	Anti-bacterial Activity ^[30]	S. C. Sati et al., 2015
<i>Colebrookea oppositifolia</i> Sm.	Lamiaceae	Binta lakri, Kala Bansa, Bambher, Lulri, Hamed	Ankh Ka Badal (An Ophthalmic Disease of Animals) , Wounds	Cataract ^[31]	PC Pandey et al, 2007
<i>Combretum roxburghii</i> Spr. <i>Syn. C. decandrum</i> Roxb.	Combretaceae	Ruel, Roel, Roylee, Patajar	Snake-Bite, Wounds	Antioxidant and Cytotoxic activity ^[32]	Bhatnagar et al, 2012
<i>Coriaria nepalensis</i> Wall.	Coriariaceae	Mosroi, Mansoor, Munsoorie, Gangeru, Gangara	Asthma	Antimicrobial Activity ^[33]	Kumar, P. et al, 2011
<i>Cotoneaster microphyllus</i> Wall ex Lindl.	Rosaceae	Bugarchilla, Wann	Diarrhoea, Wounds	Anti-microbial Activity ^[34]	Zengin G et al, 2014
<i>Cynoglossum zeylanicum</i> Thunb.	Boraginaceae	Othung, Uthung	Stomachache	Hepatoprotective and Antioxidant Activity ^[35]	Veerabahu, et al., 2013
<i>Daphne papyracea</i> Walld ex Steud.	Thymelaeaceae	Satpura	Eczema	Anti-fungal activity (Eczema) ^[36]	Javidnia K et al., 2003
<i>Daphniphyllum himalayense</i> (Benth.) Muell.-Arg	Euphorbiaceae	Ratendu, Chirnai, Ratniali	Baldness, Fungal Infections	Cytotoxic and Antioxidant Activity ^[37]	Wu H et al., 2013
<i>Debregeacia velutina</i> Gaudich.	Urticaceae	Tusara/ Sausaru	Bone Fracture	Antimicrobial Activity ^[38]	Akbar E, 2002
<i>Dicliptera bupleuroides</i> Nees & <i>Dicliptera roxburghiana</i> Nees	Acanthaceae	Saundi, Kulartore, Kuthi	Pneumonia, Cough, Gastroenteritis, Bleeding Wounds	Anti-oxidant Activity, Different Stress and Anxiety related Ailments ^[39]	Ahmad et al., 2013
<i>Dioscorea deltoidea</i> Wall ex Kunth.	Dioscoreaceae	Tairu	Uro-genital Disorders	Metabolism of Progesterone ^[40]	S.J.Stohs, 1972
<i>Galium asperifolium</i> Wallich	Rubiaceae	Leswakuri/ Kuri	Dermatitis	Antifungal Activity ^[41]	Khaliq Jan A, 2009
<i>Galium elegans</i> Wall. Ex Roxb.	Rubiaceae	Kutab, Manjeethee	Colic, Dyspepsia, Jaundice	Hepatoprotective Activity ^[42]	Olga V Goryacha et al, 2017
<i>Geranium nepalense</i> Sweet	Geraniaceae	Ratanjot	Fever, Renal Disorders, Eczema	Anti-inflammatory and Analgesic Activities ^[43]	Chunhua Lu et al., 2012
<i>Geranium wallichianum</i> Don ex Sw.	Geraniaceae	Ninai (Ninoee)/ Laljari	Boils, Ophthalmic Disorders	Anti-oxidant Activity ^[44]	Mohammad Ismail et al., 2009
<i>Grewia optiva</i> J.R. Drumm. ex Burret	Malvaceae	Bimal, Bhimal	Bone Fracture	High Resistant Fibre towards moisture, water and chemicals ^[45]	Amar S Singha, 2012
<i>Kalanchoe pinnata</i> (Lam) Pers. <i>Syn. Bryophyllum calycinum</i> Salisb; <i>Cotyledon pinnatum</i> (Lam.) Oken	Crassulaceae	Dard Patta	Bodyache	Analgesic and Anticonvulsant Effects ^[46]	T.B. Ngudefack et al., 2006
<i>Nasturtium officinale</i> R. Br.	Brassicaceae	Jairi	Goitre, Vermifuge, Constipation.	Nematocidal Effect ^[47]	Zahradníková Helena et al., 2013
<i>Nepeta hindostana</i> (Roth) Haines	Lamiaceae	Billilotan	Fever, Gonorrhea, Cardiac Tonic	Antioxidant and Antimicrobial Activities ^[48]	Abhay K. Pandey, 2015
<i>Paris polyphylla</i> Smith	Melanthiaceae	Satwa	Antihelminthic	Antitumor Activity and Antifungal Activity ^[49]	Liancai Zhu et al., 2011
<i>Picea smithiana</i> (Wall.) Boiss.	Pinaceae	Rai	Wounds, Bodyache	Antifungal, Phytotoxic and Cytotoxic Activities ^[50]	Taj Ur Rahman et al., 2016
<i>Pittosporum eriocarpum</i> Royle	Pittosporaceae	Agni	Expectorant, Bronchitis	Various alkaloids which works on respiratory disorders ^[51]	Semwal, et al., 2014
<i>Potentilla fruticosa</i> (L.) Rydb.	Rosaceae	Gesanghua	Burn problems	Antioxidant Synergy Effects ^[52]	Liu et al., 2016
<i>Potentilla fulgens</i> Hook. & <i>P. gerardiana</i> Lindley	Rosaceae	Bajradanti	Stomatitis, Wound s	Ethanol-induced Peptic Ulcers ^[53]	Gürbüz et al., 2005
<i>Potentilla nepalensis</i> Hook.	Rosaceae	Jok-jari	Antihelminthic	Healing of Colon Disorders ^[54]	Michaś Tomczyk et al.,

					2013
<i>Primula denticulata</i> Hook.	Primulaceae	Jalkutra	Diabetes, Urinary Disorders	Anti-oxidant and anti-diabetic effect ^[55]	Hemlata Bhatt et al., 2016
<i>Prinsepia utilis</i> Royle	Rosaceae	Bhekko, Bhaikul	Boils, Rheumatoid Arthritis, Diarrhea	Antioxidative and Antiosteoporotic Activities ^[56]	Rashmi Gupta, 2015
<i>Pyrus pashia</i> Buch.-Ham. Ex. D. Don	Rosaceae	Mehar, Mole, Melu	Digestive Disorders	Gastrointestinal, Respiratory and Cardiovascular Ailments ^[57]	Khalid Hussain Janbaz et al, 2015
<i>Quercus leucotrichophora</i> A. Camus	Cupuliferae	Baanj	Gonorrhea, Digestive Disorder, Scorpion Bite	Antimicrobial Activity ^[58]	Sati et al., 2011
<i>Reinwardtia indica</i> Dumortier	Linaceae	Phinuli	Tounge wash	Cytotoxic and Phytotoxic Activities ^[59]	Saima et al, 2017
<i>Rhamnus virgatus</i> Roxb.	Rhamnaceae	Chentuli, Choudelu	Eczema, Ring Worm	Phytotoxic Activity ^[60]	Prasad D, 1999
<i>Rheum australe</i> D. Don Syn <i>Rheum emodi</i> Wall., ex Meissn	Polygonaceae	Archa, Archu/Dolu	Headache, Muscular Pain	Anti-inflammatory and Analgesic Activity ^[61]	Malik et al, 2010
<i>Rubus niveus</i> Thunb.	Rosaceae	Kali achoi/ kali heesar	Wounds	Antitumor and Wound Healing Properties ^[62]	George et al., 2014
<i>Rumex hastatus</i> D.Don	Polygonaceae	Almoda/ Halmoda	Wounds, Burn	Antibacterial, Antifungal and Insecticidal Activities ^[63]	Hameed et al., 2010
<i>Sarcococca saligna</i> Meull-Arg.	Euphorbiaceae	Tiliari	Piles	Antibacterial, Antifungal, Phytotoxic, Haemagglutination and Insecticidal Activities ^[64]	Ahmad et al, 2010
<i>Siegesbeckia orientalis</i> Linn.	Asteraceae	Kachoori	Snake Bite	Anti-inflammatory and Analgesic Activity ^[65]	Yong-Han Hong et al, 2014
<i>Sonchus brachyotus</i> DC.	Asteraceae	Choply	Cough, Bronchitis.	Antioxidant and Antibacterial Activity ^[66]	Dao-Zong Xia, 2011
<i>Stephania glabra</i> (Thunb.) Miers	Menispermaceae	Gindaru	Tuberculosis, Asthma, Fever.	Antimicrobial Activity ^[67]	Semwal DK, 2015
<i>Taraxacum officinale</i> Weber ex Wiggers	Asteraceae	Dudhla	Rabies	Effective on Blood Factors ^[68]	Mehrdad Modaresi et al., 2012
<i>Thymus linearis</i> Benth.	Lamiaceae	Jangli jwan	Arthritis	Anti-inflammatory Activity ^[69]	Monika Mueller, 2010
<i>Toona ciliata</i> M.Roem.	Meliaceae	Tun	Baldness	Antifungal Activity ^[70]	I. Siddiqui et al; 2015
<i>Urtica dioica</i> L.	Urticaceae	Kandali	Dysmenorrhea, Sciatica, Rheumatism, Skin Diseases	Antioxidant, Antimicrobial, Antiulcer and Analgesic Activities ^[71]	I. Gülçin et al., 2004
<i>Wolfenia amherstiana</i> Benth.	Plantaginaceae	Dande ka kadu	Stomachache	Edema, Anti-inflammatory ^[72]	R. Cervellati et al. 2004

CONCLUSION

The ancient folk medicinal wisdom of *Jaunsari* tribes can be explored for new drug discovery and development. There are insufficient research data on evaluation and validation and Reverse Pharmacological correlation of folk medicinal wisdom of various tribe groups, particularly on the parameters of modern scientific techniques. Reverse Pharmacology has lots of scope for scientific researches on lesser known herbs utilizes folk medicine and having scientific basis and ultimately isolation, characterization and development of newer and lead phyto-medicinal components.

These lead components can be explored further by relevant in-vivo, in-vitro and clinical studies. There is a need for corroboration of various disciplines like ethno-botany, folk-medicine, traditional medicine, *Ayurveda*, chemistry, modern pharmacology for authentic exploration and validation of these wisdom. This multi-disciplinary approach of Reverse Pharmacology may lead to new innovations and development of new natural drugs and their derivatives.

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