

Role of Khadira-Triphaladi Kashaya in the management of Plaque Psoriasis: A Review

Sharma K^{1*}, Prajapati VN², Nagar RK³

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^{1*} Krishna Sharma, Post Graduate Scholar, Department of Kaumarbhritya, National Institute of Ayurveda, Deemed to Be University (De-novo), Jaipur, Rajasthan, India.

² Vishal Nandlal Prajapati, Assistant Professor, Department of Kaumarbhritya, National Institute of Ayurveda, Deemed to Be University (De-novo), Jaipur, Rajasthan, India.

³ Rakesh Kumar Nagar, Associate Professor, Department of Kaumarbhritya, National Institute of Ayurveda, Deemed to Be University (De-novo), Jaipur, Rajasthan, India.


Background: Globally, the prevalence of psoriasis ranges from 0.09% to 11.4%. It is found to be between 1.5% and 5% in the majority of developed nations. In India, its prevalence rate varies between 0.44 and 2.8%. It is an autoimmune noninfectious, chronic, inflammatory skin disorder where altered keratinization of epidermal cell takes place with well-defined erythematous lesion and silvery plaques. In Ayurveda, according to sign and symptoms of psoriasis we can correlate it with Kapha and Pitta dominant Tridoshaja Kustha. Extensive research work has been conducted on psoriasis, yet a cost-effective and palatable cure remains elusive.

Materials and Methoda: The review on effect of Khadira-Triphaladi Kashaya on psoriasis was done by compiling information from classical Ayurveda text, online pediatrics journals, research papers, recommendations and databases like Medline, PubMed etc.

Discussion and Results: All the ingredients of Khadira-Triphaladi Kashaya have the attributes of Kushthaghana (able to cure dermatological afflictions), Dushtavranvishodhana (Cleansing of a vitiated or infected wound), Kandughana (Anti-Pruritic) and have Katu, Tikta and Kashaya Rasa, Laghu, Ruksha Guna, and Ushna Veerya that are helpful in breaking the pathogenesis of Kapha and Pitta dominant Tridoshaja Kustha (~Plaque Psoriasis).

Conclusion: This paper emphasizes the effect of Khadira-Triphaladi Kashaya on plaque psoriasis.

Keywords: Ayurveda, Herbs, Kustha, Plaque Psoriasis, Skin disorder

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Krishna Sharma, Post Graduate Scholar, Department of Kaumarbhritya, National Institute of Ayurveda, Deemed to Be University (De-novo), Jaipur, Rajasthan, India. Email: krishubaag1997@gmail.com	Sharma K, Prajapati VN, Nagar RK, Role of Khadira-Triphaladi Kashaya in the management of Plaque Psoriasis: A Review . J Ayu Int Med Sci. 2025;10(4):245-254. Available From https://jaims.in/jaims/article/view/4611/	

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Introduction

Psoriasis is an autoimmune non-infectious, chronic, inflammatory skin disorder where altered keratinization of epidermal cell takes place with well-defined erythematous lesion and silvery plaques with a predilection for the extensor surface and scalp and a chronic fluctuating course.[1] Psoriasis is becoming a major worldwide issue, according to a global report on the condition, because it is getting more common in all nations, regardless of age, gender, or cultural background. [2] Since 1970, the prevalence of psoriasis in youngsters has increased, with a 1:1 female to male ratio.[3] According to estimates, between 30% and 50% of adult instances of psoriasis occur before the age of 20.[4]

According to sign and symptoms of plaque psoriasis we can correlate it with *Kapha* and *Pitta* dominant *Tridoshaja Kustha*. *Kustha* is caused by morbidity of 7 factors i.e., *Tridoshas*, viz. *Vata*, *Pitta* & *Kapha* vitiates 4 *Dhatus* of the body viz. *Tvaka* (Skin), *Rakta* (blood), *Mamsa* (Muscle) and *Lasika* (Lymph) which are called as '*Saptadravya Sangraha*' (Seven substances involved in the pathogenesis of *Kustha*). Due to indulgence of *Nidana*, aggravation of *Doshas* in general and *Vata-Kapha* in particular occurs results in production of *Ama* and *Dhatu Shaithilya*. The vitiated *Dosha* along with *Ama* move through *Tiryakgata Sira* and get settled into the *Tvaka* and *Mamsa* along with vitiated *Rakta* and *Lasika*, this leads to obstruction in *Rasvaha* (Nutrient Channels), *Raktavaha* (Blood Channels), *Mamsavaha* (Muscle Channels) and *Svedavaha Srotas* (Sweat Channels) producing its symptoms. If *Kustha* is not treated in this phase it further progress to deeper *Dhatus*. [5] *Samprapti Vighatanam Eva Chikitsa*". Ayurveda emphasizes on "*Swasthasya Swasthya Rakshanam* and *Aturasya Vikara Prashamanam*" (to maintain the health of the healthy and to cure the diseases of the sick) hence *Chikitsa* can be considered as *Kriya* or *Karma* which maintains the *Samyata* in *Dosha*, *Dhatu*, *Mala* and *Agni*; and simultaneously also cures the disease.[6] The effects of *Khadira-Triphaladi Kashaya* on psoriasis are the subject of this review. *Khadira-Triphaladi Kashaya* is described in various Ayurvedic literatures, including *Sahasrayogam*. *Khadira*, *Vasa*, *Patola*, *Amirta*, *Nimba*, *Amalaki*, *Haritaki*, and *Vibhitiki* are the eight ingredients that make up *Khadira-Triphaladi Kashaya*. [7]

Aim and Objectives

To explore the role of *Khadira-Triphaladi Kashaya* in the management of Plaque Psoriasis.

Materials and Methods

The review was conducted by compiling information from classical Ayurvedic texts, online journals, research papers, and databases like PubMed, Google Scholar, and Medline. Through the associated publication websites, the full text of those researches is accessible in pdf format.

Table 1: Ingredients of *Khadira-Triphaladi Kashaya* [7]

SN	Name	Latin Name	Family	Parts used
1.	Khadira	Acacia catechu Linn.	Leguminosae	Hard bark
2.	Vasa	Adhatoda vasica Ness.	Acanthaceae	Leaves
3.	Patola	Trichosanthes dioica Roxb.	Cucurbitaceae	Leaves
4.	Amrita	Tinospora cordifolia Wild.	Menispermaceae	Stem
5.	Nimba	Azardiracta indica A.Juss.	Meliaceae	Leaves
6.	Triphala	Embolica officinalis Gaerth.	Euphorbiaceae	Fruit
	■ Amalaki	Terminalia bellirica Roxb.	Combretaceae	Fruit
	■ Vibhitaki	Terminalia chebula Retz.	Combretaceae	Fruit
	■ Haritaki			

Table 2: The *Rasa-Panchaka* of contents of *Khadira-Triphaladi Kashaya*

SN	Ingredients	Rasa	Guna	Virya	Vipaka	Doshagnata
1.	Khadira [8]	Tikta, Kashaya	Laghu, Ruksha	Sheeta	Katu	Kaphapittahara
2.	Vasa [9]	Tikta, Kashaya	Laghu, Ruksha	Sheeta	Katu	Kaphapittahara
3.	Patola [10]	Tikta	Laghu, Ruksha	Ushna	Katu	Tridoshasamaka
4.	Amrita [11]	Tikta, Kashaya	Laghu, Ruksha	Ushna	Madhura	Tridoshasamaka
5.	Nimba [12]	Tikta,	Ruksha	Sheeta	Katu	Pittanashaka
6.	Amalaki [13]	Pancharas (Amlapradhan)	Laghu, Ruksha	Sheeta	Madhura	Tridoshahara
7.	Vibhitaki [14]	Kashaya	Laghu, Ruksha	Ushna	Madhura	Kaphapittahara
8.	Haritaki [15]	Pancharasa (Lavanavarjita)	Laghu, Ruksha	Ushna	Madhura	Tridoshahara

Table 3: Ayurveda properties of ingredients of Khadira-Triphaladi Kashaya

Drug	Ayurveda Properties
Khadira[8]	Raktasodhaka, Kushthagha, Krimighana, Varnya.
Vasa[9]	Kusthagna, Ratkapittaha
Patola[10]	Kushtha and Kandu, Deepan, Varnya
Amrita[11]	Rasayana, Balya, Agnidipana, Raktasodhaka
Nimba[12]	Krimighna, Kushthahar, Varnya and Amasotha
Triphala	Rasayana, Raktapittahara
Amalaki [13]	Bhedaka, Kriminashana,
Vibhitiki [14]	Rasayana, Anulomana, Deepana,
Haritaki[15]	

Table 4: Chemical constituents found in the ingredients of Khadira-Triphaladi Kashaya

Drug	Chemical Constituents
Khadira	Glycosides: Poriferasterol, poriferasterol acylglucosides, Tannins: Gallic acid, d-rhamnose, Sugars: Dgalactose, and l-arabinose, phlobatannins., Triterpenoids.[16]
Vasa	Vasicine, Adhatodine, Adhatonine, Adhavasine, Anisotine, Vasakine, DeoxyandN -Oxide, Vasicinol, Vasicinone, Vasicinolone, Vasicoland Betaine, Steroid Beta-Sitosterol.[17]
Patola	Vitamin A, vitamin C, tannins, saponins.[18]
Amrita	Tinocordifolioside, Ecdysterone, Tinosporin, Jatrorrhizine, Aporphine Alkaloids, Tetrahydropalmatine.[19]
Nimba	Nimbidin, Nimbidal, Azadirachtin, Meliantriol, Nimbin, Azadirine, gedunin, Salanin.[20]
Amalaki	Ascorbic acid and gallotannins.[21]
Vibhitiki	Beta-Sitosterol, Gallic Acid, Chebulagic Acid and Termilignan, Hydroxy-3', 4'-(Methylenedioxy) Flavan, And Anolignan-B.[22]
Haritaki	Gallic Acid, Chebulic Acid, Punicalagin, Chebulanin, Corilagin, Neochebulinic, Ellagic Acid, Chebulegic Acid, Chebulinic Acid.[23]

Khadira (Acacia catechu Linn.)

Ayurveda Pharmacology Action: *Khadira* contains *Tikta-Kashaya Rasa* (bitter & astringent taste). These two *Rasas* by virtue of their pharmaco. properties like *Soshana* (absorption), *Vishaghnatva* (anti poisonous), *Kandu Prashamana* (reduce itching sensation), *Tvakmamsa*, *Sthirikarana* (nourishment & strengthening of skin & muscle) & *Pidana*, *Ropana* (wound healing), *Kledaupashosana* (dry of exudation) causes therapeutic action of reducing edema, detoxification, restoration, antihistaminic action & contraction, healing, clearing of derbies.[24]

Modern Pharmacology Action

Anti-inflammatory effect: *A. catechu* increases the secretion of IL-10 (plays a role in immunoregulation and inflammation),

And inhibits the production of TNF- α (mediator of inflammatory response) secreted by monocytes and macrophages.[25]

Immuno-modulatory effect: Study on Wistar albino rats shows that the aqueous extract of *Acacia catechu* has significant effect on both the cell mediated and the humoral immunity. The exact constituent(s) responsible for the immunomodulatory effect is not known.[26]

Anti-oxidant effect: Study of 70% methanol extract of heartwood extract of *Acacia catechu* showed significant antioxidant activity, iron chelating and DNA protective activity which is partly due to phenolic and flavonoid compounds present in its Standard methods like dot blot assay, TLC study and DPPH assay showed that AC extract is a highly effective antioxidant. Catechin, rutin and isorhamnetin are reported as free radical scavengers and these compounds largely contribute to biopotency of *Acacia catechu*. [26]

Wound healing effect: In Asia crushed bark of *Acacia catechu* Willd is used topical on wounds as it is potent wound healing medicinal plant. It has astringent effect and also causes precipitation of skin which makes it very good wound healing plant. Furthermore, it also exhibits antimicrobial property which prevents growth of microbes on wounds. This activity is due to presence of tannins and flavonoids in bark of *Acacia catechu wild*. [27]

Vasa (Adhatoda Vasica Ness.)

Ayurveda Pharmacology Action: In *Gunaratnamala* of Bhavamishra 'Aarusha' word has been used in place of *Vasa* and its *Guna Karma* along with characteristic features of *Vasa* are described as *Sheeta Virya*, *Tikta-Kashaya Rasa*, *Laghu Guna*, and indicated in *Kapha-Pittarakatanashak* and mentioned in the treatment of *Kustha* (skin diseases). [28]

Modern Pharmacology Action

Anti-inflammatory effect: A dose of 50 μ g/pellet alkaloid fraction (methanol extract), has been reported to be potent anti-inflammatory agent as was shown in modified hen's egg chorio-allantois membrane test. [29]

Immuno-modulatory effect: Methanolic, chloroform and diethyl ether extract of leaves of *Adhatoda vasica* Linn.

Were pharmacologically validated for its immunomodulatory properties in experimental animals. Oral administration of extracts at a dose of 400 mg/kg in adult male Wistar rats significantly increased the percentage neutrophil adhesion to nylon fibers ($P < 0.001$). The observed results at different doses were significant when compared to control groups. These findings suggested that the extracts of this plant, *A. vasica* Linn positively modulates the immunity of the host.[30]

Anti-oxidant effect: Antioxidant activity of methanol extract of *A. Vasica* was estimated by total antioxidant activity, 2,2 diphenyl-1-picrylhydrazyl radical scavenging activity, reducing power potential and iron chelating activity. Extract showed high antioxidant activity in various antioxidant experiments. The extract of *A. Vasica* showed presence of high levels of polyphenolic compounds (phenolic compounds and flavonoids), which could be the possible reason behind the antioxidant activity of the plant.[31]

Wound healing effect: Vasica improved breaking strength, tensile strength, absorption and extensibility in the wound repair tissue. In addition, the levels of elastin, collagen, hydroxyproline, hexosamine and zinc were greatly increased in the animals treated with Adhatoda. The alcoholic extract of the herb was found to be the most effective.[32]

Patola (*Trichosanthes dioica* Roxb.)

Ayurveda Pharmacology Action: In *Bhavaprakasha Nighantu*, *Patola Patra* is mentioned '*Pitta Shamaka*'. *Patola* is also known as '*Tikta*'; as it is rich in *Tikta Rasa*, which is helpful for *Pitta Dosha Shamana*. *Patola* is mentioned as '*Sukhena Virechana*' which can help to remove the toxins from the body.[33]

Modern Pharmacology Action

Anti-inflammatory effect: The study evaluated anti-inflammatory effects of triterpenoid enriched extract of *T. dioica* root (CETD) in rodents at the doses of 50-100 mg/kg body weight. CETD was evaluated for anti-inflammatory activity in experimental acute carrageenan histamine & serotonin induced paw (edema) & chronic models (cotton pellet induced granuloma) in Wistar albino rats. In all the anti-inflammatory models, CETD exhibited promising anti-inflammatory activity in a dose dependent manner.[34]

Immuno-modulatory effect: Aqueous extract of *T. dioica* fed to albino rats at different doses (100 and 200 mg/kg body weight for 45 days) and immunomodulatory, biochemical and hematological effects were observed. It was noted that the extract enhanced antibody formation and higher level of red blood cells (RBC), white blood cells (WBC) and hemoglobin in a dose dependent manner, leaving the biochemical parameters unaltered.[35]

Anti-oxidant effect: Anti oxidant activity of aqueous extract of *Trichosanthes dioica* (TSD) fruits was studied for its free radical scavenging property in different in vitro methods as 1, 1 diphenyl-2-picryl hydroxyl, DPPH assay, nitric oxide, reducing power assay and hydrogen peroxide radical method. The findings could justify the inclusion of this plant in the management of antioxidant activity.[36]

Wound healing effect: Methanolic pointed gourd fruit extract on healing of wounds in three groups of rats was investigated. For this, excision and incision wounds were induced on rats, after which two of them was treated with ointment and standard silver sulfadiazine (0.01%) and group three was given 5% w/w *T. dioica* ointment. Parameters like wound contraction percent, epithelialization time, hydroxyproline content, tensile strength along with histopathological studies were observed on rats. The study revealed that *T. dioica* possesses wound healing effect.[37]

Laxative effect: The laxative activity of TDA (100 and 200 mg kg⁻¹ body weight per os) was evaluated by assessing the excretory bowel activities in naive (non-constipated) and in drug (loperamide)-induced constipation in mice.[38]

Amrita (*Tinospora cordifolia* Wild.)

Ayurveda Pharmacology Action: In *Sushruta Samhita*, *Guduchi* is traditionally claimed for the treatment of diseases like *Kustha* (Leprosy). *Guduchi* is considered one of the best *Rasayana*. *Rasayana* effect of *Guduchi* can be used to heal & prevent infections.[39]

Modern Pharmacology Action

Anti-inflammatory effect: The water extract of stem part showed anti-inflammatory role in albino rats. It has significantly suppressed acute inflammatory response caused by carrageenin extract when applied orally.[40]

Immuno-modulatory effect: The alcoholic extract of *T. cordifolia* showed significant immunomodulatory effects. At standard dose, extract increased the α -amylase activity and cellularity of bone marrow in rats. It had been observed by some researchers that some active compounds viz; 11-hydroxymustakone, N-methyl-2-pyrrolidone, N-formylannonain, cordifolioside Amagnoflorine, tinocordiside and syringing showed immunomodulatory activity.[41]

Anti-oxidant effect: Various extracts of *T. cordifolia* exhibits an anti-oxidant potential by scavenging the free radicals and other reactive species respectively. *T. cordifolia* significantly reduces the regulation of lipid peroxidation process thereby decreasing the level of reactive free radical species in a diabetic rat model (alloxan induced diabetes) and up regulates antioxidant enzymes like catalase and glutathione indicating its anti-oxidant effects.[42]

Nimba (*Azadirachta indica* A.Juss.)

Ayurveda Pharmacology Action: *Nimba Rasa* (Taste) is *Tikta*, *Kashaya*, *Guna* (Qualities) are *Laghu*, *Ruksha*, *Veerya* (Potency) is *Sheeta*, *Vipaka* (Post-digestion effect) is *Katu* and *Karma* (Pharmacological activity) are *Kaphaghna*, *Pittaghna Karma*. *Nimbapatra* is *Shothghna*, *Tvagadoshahara*, *Krimighna*, *Kushthahara*, *Vranashodhaka* and *Vranaropaka*. [43]

Modern Pharmacology Action

Anti-inflammatory effect: A study result has confirmed that extract of *Azadirachta indica* leaves at a dose of 200 mg/kg, p.o, shows significant anti-inflammatory activity in cotton pellet granuloma assay in rats.[44]

Immuno-modulatory effect: Effects of feeding of powdered dry leaves of *A. indica* (AI) on humoral and cell mediated immune responses, in broilers and results showed that AI (2 g/kg) treatment significantly enhanced the antibody titers against new castle disease virus (NCDV) antigen.[45]

Anti-oxidant effect: A valuable study was carried out to evaluate in vitro antioxidant activity in different crude extracts of the leaves of *Azadirachta indica* (*Neem*) and antioxidant capacity of different crude extracts was chloroform extract > butanol extract > ethyl acetate extract > hexane extract > methanol extract.

Result of the current finding suggested that the chloroform crude extracts of neem could be used as a natural antioxidant.[46]

Wound Healing Effect: A study was made to evaluate the wound healing activity of the extracts of leaves of *A. indica* and *T. cordifolia* using excision and incision wound models in Sprague Dawley rats and results revealed that extract of both plants significantly promoted the wound healing activity in both excision and incision wound models.[47]

Triphala

Ayurveda Pharmacology Action: *Triphala* known as '*Tridoshic Rasayana*', in Ayurveda shows steady and rejuvenated effects on three major elements of life i.e. *Vata* (mind/nervous system), *Pitta* (bile) and *Kapha* (mucus) in the *Charaka Samihita*. [48] One among the key ingredients of *Triphala* is *Amalaki*. *Terminalia chebula* Retz and *Terminalia bellerica* Roxb have a warm energy, while *Emblica officinalis* Gaertn is cool in nature. *Triphala* is a balanced mixture of all the three which make it useful as an internal cleansing, detoxifying formula. It's a vital *Rasayana* and good purgative in Ayurvedic medicine.[49]

Modern Pharmacology Action

Anti-inflammatory effect: In another study studied the efficacy of *Triphala* on monosodium urate crystal -induced inflammation in mice where significant inhibition in paw volume, levels of lysosomal enzymes, LPO and inflammatory mediator tumour necrosis factor - α was found.[50]

Immuno-modulatory effect: The immunomodulatory activities of *Triphala* on various functions of neutrophil such as adherence, phagocytosis, avidity index (A.I.) and nitro blue tetrazolium (NBT) test were assessed. It was observed that these changes were significantly reduced and prevented by oral administration of *Triphala*. Neutrophil functions in case of immunized rats and stress induced suppression in the neutrophil functions were significantly prevented by *Triphala*. [51]

Anti-oxidant effect: Major phenolic compounds such as total phenols, flavonoids and triterpenoids contents of *Terminalia chebula* extract showed significant antioxidant activity by free radical scavenging activity and inhibition of DNA damage of plasmid.

Triphala is also useful for free radical induced disorders such as paracetamol toxicity, heavy metal and radiation.[52]

Wound healing effect: *Triphala* incorporated collagen sponge was found to increase the thermal stability, water uptake capability, produce faster wound closure, improved regeneration of tissue, increased collagen content at the wound site, and supporting histopathological parameters related to wound healing.[53]

Laxative effect: The study has shown that the *Triphala* extract has the ability to increase the bowel movement in constipation condition induced by loperamide. Administration of the extract increased the fecal output and increasing the amount of extract increased the bowel movements in rats which in turn increased the total fecal output.[54]

Discussion

In Ayurveda, *Samprapti Vighatana* refers to the disruption or reversal of the disease pathogenesis by balancing the vitiated *Doshas* and correcting the underlying tissue damage. In the case of plaque psoriasis, dominated by *Kapha* and *Pitta Dosh*, the combination of specific herbs plays a significant role in this process.

Khadira-Triphaladi Kashaya are *Laghu*, *Ruksha Gunatmaka*, *Katu- Madhur Vipaki*, *Ushna-Sheeta Virya*, *Tikta* and *Kashaya Rasapradhana*. *Karma* of *Kashaya Ras* on *Tvaka* is *Ropana* (heals up), *Soshana* (dries up), *Sodhana* (purifies), *Lekhana* (scrapes out unwanted tissue), *Asravisodhana* (purifies the blood), *Kledupsoshana* (dries pus and any discharge from skin), *Satambhana* (stop blood-letting from skin).[55]

Tikta Rasa itself is *Kusthaghna* (able to cure dermatological afflictions) *Vishaghna* (antidote to endogenous toxins), *Kandughna* (anti-pruritic), *Twaka-Mamsasathiarakar* (stabilizers of skin and muscles).[56] *Laghu Guna* has properties of *Lekhana* (scraping of the wound) *Varna Ropana* (wound healer) and *Ruksha* has properties of *Soshana* (dry any discharge or pus), *Kathinyakara* (dissolve excessive smoothness), *Kharsparsha* (dry up excess oil).[57] *Khadira*, *Vasa*, *Nimba*, *Amalaki* are *Sheeta Virya* and *Karma* of *Ushna Virya* on *Tvaka* is *Kledana/Prasanta* (moistening), *Raktaprasadaka* (blood purifier) *Rakt-Pitta Shamaka*.

Patola, *Guduchi*, *Vibhitaki* and *Haritaki* are *Ushna Virya* and *Karma* of *Ushna Virya* on *Tvaka* is *Dahana* (burning sensation), *Swedana* (induce sweating), *Kapha Vatasamaka*. [58] *Khadira*, *Vasa*, *Nimba*, *Patola* are *Katu Vipaki* and *Karma* of *Katu Vipaka* on *Tvaka* is *Ruksha*, *Kapha Samaka* and *Guduchi*, *Amalaki*, *Vibhitaki* and *Haritaki* are *Madhura Vipaki* and *Karma* of *Madhura Vipaka* on *Tvaka* is *Snigdha*, *Guru*, *Vata-Pitta Shamaka*. [59-60] *Patola* and *Triphala* have laxative properties. *Triphala* and *Guduchi* have *Rasayana* qualities. *Rasayana* is a type of medicine that improves physical and mental health, prolongs life, stops aging, strengthens memory, and boosts immunity and resistance to disease. Because *Rasayana* possesses antioxidant and immune-modulating qualities, and *Medhya Rasayana (Guduchi)* has nootropic qualities that enhance intelligence and brain function. [61] *Khadira* has constituent like catechins, by virtue of their antimicrobial, anti-inflammatory, antiviral, and antioxidant effect may be the main constituents responsible for their activity. [62] *Azadirachta indica* has complex of various constituents including Nimbidin and Nimbin, which prevents redness and swelling thereby retaining the skin moisture. [63]

Conclusion

According to a number of studies that are referenced in this article, most of the drugs of *Khadira-Triphaladi Kashaya* have properties like *Tikta*, *Kashaya Rasa* and *Ushna Virya* which does the *Shamana* of *Kapha* and *Pitta Dosh*. It has properties like *Raktashodhana*, *Kushtaghna* and *Kandughna* and also have immunomodulatory effect, antioxidant, laxative effect, anti-inflammatory property and wound healing properties. Hence *Khadira-Triphaladi Kashaya* is proven to be beneficial in mitigating the classical signs and symptoms of plaque psoriasis.

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