



CASE REPORT

Therapeutic Potential of Tender Coconut based Decoction in Infected Stage of Atopic Dermatitis- A Case Report

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Abstract

Introduction

Atopic dermatitis (AD) is a relapsing and highly pruritic dermatitis of chronic nature, which usually develops in the first 5 years of life. The major co-morbidities associated with Atopic dermatitis are infections, eosinophilia and other allergies. Ayurveda has a vast formulary of medications in the management of paediatric dermatologic conditions. Tender coconut-based decoction are mentioned in the *Keraleeya Balachikitsa* text "*Vaidyatharakam*" in the context of the disease *Karappan* which can be correlated to various kinds of skin diseases in children.

Case Presentation

A 9-year-old boy diagnosed as Atopic dermatitis by Hanifin and Rajkas criteria since the age of 6 months showed features of super added infection like oozing, tenderness, redness and intense itching. Investigations showed a rise in IgE, CRP and presence of *Staphylococcus aureus* in the skin lesion. He used to be on antihistamines and antibiotics during the intermittent flare ups during these years.

The current case was treated with oral and topical administration of *Karikku Kashayam* for 7 days and significant remission in the clinical features was observed. The course of skin infection was analysed on 4th, 7th, 15th day and after a follow up period of 1 month using SCORAD, POEM and SIRS score and Grading of *Kushta*.

Results

After 7 days of dual mode of administration of *Karikku Kashayam*, oozing, itching, redness and area of the lesion reduced significantly. Significant reduction in the POEM and SCORAD score was seen with a difference of 15 and 11.5 respectively. Both SIRS score and Preliminary arbitrary grading system of *Kushta* turned zero.

Conclusion

Considering the difference in SCORAD, POEM, SIRS and Preliminary Arbitrary Grading System scores, it can be concluded that oral and topical administration of *Karikku Kashayam* is an effective treatment modality for managing infected stage of Atopic Dermatitis.

Introduction

Atopic dermatitis (AD) is a chronic, relapsing, and highly pruritic dermatitis with a period prevalence of 2.4 -6% in India.^[1] It has a characteristic age-dependent distribution with facial, scalp, and extensor involvement in infants and young children with predominant flexural involvement in older children and adults^[2]. Intense itching and xerosis are common features in children with atopic dermatitis and is characterized by exacerbations and remissions, but the cause of flares remains uncertain.^[3] Loss of skin barrier integrity appears essential for the development of Atopic Dermatitis^[4]. According to recent reports Atopic dermatitis is associated with a decrease in the production of Antimicrobial Peptides (AMPs) in the skin, which are a group of molecules which protects the skin from bacteria, fungi, and viruses.^[5] The reduction might be due to the less amount of IL-17 (an inducer of AMPs) and suppressive effect of Th2 cytokines (present in higher quantities in AD).^[6]

Major aggravating factors of this disease include outdoor and indoor environmental factors, lifestyle factors like specific foods, sweating, physicochemical stimuli and psychological stresses. The major line of management of AD includes moisturisers, wet wrap therapy, various bath practices, topical corticosteroids, immunosuppressants and phototherapy.^[7] The major co-morbidities associated with Atopic dermatitis are infections, including *Staphylococcus aureus* (*S. aureus*) superinfection followed by *Streptococcus pyogenes* whose virulence is due to staphylococcal enterotoxins (superantigens).^[8]

Physical signs suggesting infection of atopic dermatitis are pustules, crusting, and a weeping discharge. Focal erythema, swelling, warmth, oozing and tenderness are the usual signs of these infections and the patients may experience fever and bacteraemia.^[9] More than 80% of *S. aureus* isolated from AD patients are superantigen-producing^[10]. Skin barrier defects, increased skin pH, a decrease in AMPs, or Th2 cytokines are potential contributing factors to the enhanced risk of skin infections.^[11]

When compared with the general population, those with Atopic dermatitis are at increased risk of colonization by methicillin-resistant *S. aureus* (MRSA).^[12] Still antimicrobials, which cause dysbiosis by virtue of their activity, are being used routinely to target *S. aureus* in the management of this condition^[13]. Hence the main concern with the overuse of antibiotics in flare ups of Atopic dermatitis is the potential development of (AMR) and dysbiosis which further contribute to the colonization of *S. aureus*.^[14]

Here lies the scope of Ayurveda which has a wide and effective formulations for paediatric dermatological conditions. *Karikku Kashayam* is a formulation very extensively mentioned in *Vaidya tharakam*, (a text of *Keralaleeya balachikitsa* (~pediatric practice of Kerala). This is a method of decoction preparation where tender coconut water is the liquid base. The mode of preparation has been described in a very detailed and distinct manner in the text. The ingredients are listed in Table 1.

Table 1: Constituents of Karikku Kashayam

Latin name	Sanskrit name	Drug (local name)	Quantity (g)
<i>Celastrus paniculatus</i>	Jyothishmathi	Cherupunnayari	1.5
<i>Syzygium aromaticum</i>	Lavanga	Grambu	1
<i>Piper cubeba</i>	Kankolam	Vaalmulaku	1
<i>Anacyclus pyrethrum</i>	Aakallaka	Akraavu	1
<i>Myristica Gronov.</i>	Patri	Jathipatri	1
<i>Myristica Gronov.</i>	Jatiphala	Jathikka	1
<i>Swertia chirata</i>	Nilaveppu	Kiriyaathu	4
<i>Piper nigrum L.</i>	Maricha	Mulaku	1.5
<i>Piper longum L.</i>	Pippali	Thippali	1.5
<i>Zingiber officinale</i>	Shunti	Chukku	1.5
<i>Artemisia vulgaris L.</i>	Damanaka	Makkipoovu	4
<i>Quercus infectoria</i>	Mayaphala	Mayakku	4
<i>Cassia fistula L.</i>	Aragwadha	Konna	4
<i>Embolia officinalis</i>	Amalaki	Nellika	4
<i>Embelia ribes</i>	Krimishatru	Vizhalari	1.5
<i>Cinnamomum tamala L.</i>	Patra	Pachila	4
<i>Foeniculum vulgare Mill.</i>	Deergagham	Perumjeerakam	1.5
<i>Carum carvi L.</i>	Krishnajeera	Karinjeerakam	1.5
<i>Cuminum cyminum L.</i>	Jeeraka	Jeerakam	1.5
<i>Acorus calamus</i>	Vacha	Vayambu	4
<i>Holarrhena pubescens</i>	Kutaja	Kudakapalayari	1.5
<i>Elattaria Maton</i>	Ela	Elathari	1.5
<i>Coriandrum sativum</i>	Dhanyaka	Kothambalari	1.5
<i>Psoralea corylifolia L.</i>	Bakuchi	Karkokilari	1.5
<i>Cocos nucifera</i>	Gowrigatram	Chenthengin Karikku	1 tender coconut

Case presentation

Patient Information

A 9-year-old boy with a history of chronic Atopic Dermatitis since the age of 6 months presented with pustular skin lesions on the right foot associated with pain, oozing and itching in the last five days. The child had itchy dermatitis on the cubital and popliteal fossae on his extremities along with diffuse dryness of skin. The disease had started in the infancy as redness and dryness of cheeks that gradually progressed to arms, lower legs. Itching increased at night causing sleep disturbances. He had exacerbations in itching during winter months which used to subside by moisturising medications. The condition had aggravated in the right foot following playing football during rainy weather. The child had recurrent episodes of upper respiratory infection in the early childhood. He was on antihistamines and antibiotics during flare ups and had gradually shown remission with only occasional sneezing and running nose in the morning hours. The parents did not have any history of atopy, but grandmother has a history of asthma.

Written informed consent from the parent was recorded before initiating the treatment.

Clinical Findings

General and systemic examination

The child was of medium build and BMI was 22.5. On physical examination, scratch marks were seen on the flexor aspects of extremities and allergic shiners in the lower aspect of both eyes. Nasal examination showed hypertrophied turbinate on the right side. Respiratory, GIT and cardiac examination did not produce any significant findings.

Multiple lesions with oozing and yellowish coloured crusts were found on the right foot. Laboratory testing showed that TLC was 9800/mm³, CRP was 2 mg/l and total serum IgE level was markedly elevated at 1300 IU/ml. Culture and sensitivity of the lesion showed the growth rate of *Staphylococcus aureus* as moderate.

Rogi samanya pariksa (~General examination as per Ayurveda)

Dasavidha pariksa:

Prakriti of patient was *Vatakaphaja*, Vikriti was *Pittapradhana Tridoshaja*, *Sara*, *Samhanana* and *Vyayama Shakti* were *Avara*, *Jarana shakti*, *Ahara shakti*, *Satva*, *Sathmya* and *Bala* were found to be *Avara*.

Samprathi Ghataka:

Dosha (~body humour): *Pithakapha Pradhana Tridoshaja* (~predominance of *Pitha* and *Kapha*)

Dooshya (~structural components): *Rasa Raktha Lasika*

Srothas (~body channels): *Rasavaha*, *Rakthavaha*, *Udakavaha*

Agni (~digestive fire): *Dhatvagnimandya* and *Jataragnimandya* (~reduction in macro and microelements of digestive fire)

Rogamarga (~Disease pathway): *Bahya*(~external)

Diagnostic Assessment

The diagnosis was made by skin examination and medical history as atopic dermatitis is identified clinical features and not by laboratory tests. Among the Hanifin and Rajkas criteria, [15] all major criteria like pruritis, morphology and distribution of lesions, family history of atopy and chronic relapsing dermatitis and minor criteria such as xerosis, elevated IgE levels, itching when sweating and wool intolerance were present in the child. Assessment was done using SCORAD index, [16] Patient Oriented Eczema Measure (POEM) Score, [17] Skin Infection Rating Scale (SIRS) [18] and Preliminary arbitrary grading system of dosha assessment in *Kushta* [19] (~skin diseases). The primary assessment for infection was Skin Infection Rating Scale.

On examination of the lesions, SCORAD index score was 51.5, POEM score was 19, both an indication of severe atopic dermatitis and SIRS score was 11.

On Ayurveda diagnostic parameters, the present flare up condition involving pain, itching discolouration and pus discharge was diagnosed as a case of *Pithakaphaja* (~body humours) stage of *Podi Karappan* or *Renuka Visarpam* [20] (~a variety of skin lesion occurring in children).

Timeline

The patient was administered *Karikku Kashayam* (~tender coconut decoction) [21] as oral and topical therapy for 7 days. The timeline is depicted in Table 2.

Intervention

The dosage and mode of administration of medication is given in Table 2.

Appropriate diet control and management strategies were discussed with the patient's family. The parents were instructed not to include milk and products, fried items, refrigerated foods and soft drinks, garlic, tubers, bakery items, excess salt, sour and spicy food like pickles, pappad, dried fish in the child's diet.

Method of preparation of *Karikku Kashayam*: [22]

Drugs of the formulation were powdered. The upper part of the outer green husk of a tender coconut (6–7-month-old so that water content and sweet taste will be high) of *Gowrigaatram* (~Chowghat Orange Dwarf variety) was peeled and coconut water collected after putting a hole in the upper

Table No.2: Timeline and Therapeutic intervention

Intervention	Medicine	Dosage	Duration	Adjuvant
Oral therapy	<i>Karikku Kashayam</i>	50ml decoction thrice daily one hour before food	7 days	Honey
Topical therapy	<i>Karikku Kashayam</i>	200ml in divided doses, thrice daily for 20 minutes as wet packs.	7 days	NIL

**Figure 1:** Day 1**Figure 2:** Day 4**Figure 3:** Day 7**Figure 4:** Day 10

portion. The quantity of drug powder (50g) required for the preparation of *kashaya* (~decoction) was instilled in the tender coconuts. Coconut water was refilled and the opening properly sealed with a wooden cork. The coconut was kept in a closed steel vessel with 3 litres of water and steam boiled in medium flame till 750 ml of water remains. The tender coconut was opened, decoction collected and strained. It was used for both internal administration and topical use.

Follow Up and Outcome

The crusting, itching, oozing and pain reduced by the 4th day. On the 7th day of assessment, signs of infection had completely subsided. Given in Table 3.

No adverse events were noticed during the treatment. The follow up visit was planned to assess the healing process, return of skin integrity and any relapse of the disease. The child came to the OPD after three weeks. He was relieved of oozing, itching, blisters and reported improvement in sleep. TLC, CRP and IgE on 30th day were 6100 /mm³, 3.2 mg/l and 940 IU/ml respectively.

Table 3: Assessment Score during the course of treatment

Assessment	SIRS	POEM	SCORAD	*Preliminary Arbitrary Grading of <i>Kushta</i>
Baseline	9	19	51.5	10
Day 4	2	-	47.5	5
Day 7	0	3	41.5	0
Day 10	0	3	41.5	0
Day 45	0	4	40	0

*Note: The preliminary arbitrary grading of *Kushta* is a standardized scoring system developed to evaluate the severity of skin disorders based on classical ayurvedic features according to the predominant *Dosha* (humor), often validated with clinical photography

Discussion

The textbooks of traditional pediatric practice like *Vaidyatarakam* and *Arogyakalpadrumanam* have a detailed description of the disease *Karappan* or *Visarpa* (~comparable to skin diseases associated with itching, discharge, pain, and other inflammatory signs).^[23] Based on dosha predominance, *Karappan* is of nine types and is again divided into 51 varieties, based on the morphology of lesions. Among the nine varieties, *Vataja Visarpa* (~type of lesion) is pain and dryness predominant and *Pittaja* (~type of lesion) variety is fast spreading with oedema, vesiculo- pustular lesions, reddish discolouration and burning sensation.^[24] *Podikarappan* or *Renuka visarpa* shows lesions as if sprinkled by dust spreading over full body, generalized puffiness, later skin gets cracked associated with boils similar to *Masura*(~lentils), painful and tender.^[25] Atopic Dermatitis can be considered under the broad classification of *Karappan* or *visarpa* and the flare up stage is *pithakapha* (~type of lesion which is a combination of two humours) predominant.

It has been advised in classics to administer medicines which are of *Soumya* (~gentle) and *mridu guna* (soft quality)^[26] to children so as not to hamper the continuous growth and development of childhood. As per the texts, *Karikku kashayam* is *Tridoshahara* and can be used in all varieties of skin infections. The ingredients and the formulation are safe and effective in pediatric infectious skin disorders. In addition to medicinal properties, *Karikku Kashayam* has nutritional components due to the presence of tender coconut which possesses several biologically active components, growth promoting factors and is rich in proteins, minerals, vitamins, calcium, phosphorus, iron, iodine, chlorine, sulphur, potassium, magnesium, carbohydrates and vitamins B1, B2 as well as B5 and has pharmacological activities like hepatoprotective, anti-inflammatory, antipyretic, wound healing and antioxidant actions.^[27]

Coconut water is said to be *Sheetala* (~cold), *Hridya* (~digestive stimulant), *Shukrala* (~light). It relieves *Pitta*, *Pipasa* (~thirst) and is *Basti shudhikara* (~diuretic).^[28]

Apart from this, *Karikku Kashayam* has many ingredients that have anti-inflammatory, antimicrobial and antioxidant activity. *Jeeraka* (~Cumin seed) has potential antioxidant and antimicrobial activity. This antibacterial action was assessed using Cumin seed oil and alcoholic extract. It was proven that these inhibited the growth of *Klebsiella pneumoniae* and its clinical isolates. Biofilm-formation preventive properties which were found against *Streptococcus pyogenes* and *Streptococcus mutans* was attributed to cumin aldehyde.^[29]

Shadthandula present in *Karikku Kashayam* is a combination of six herbal seeds which have been used as a single preventive remedy for many common ailments by the traditional practice in Kerala. *Kutaja* (*Holarrhena antidysenterica*) have anti-oxidant and analgesic properties.^[30] *Bakuchi* (*Psoralea corylifolia*) possessed antibacterial activity against *Staphylococcus aureus* (SA), β -lactamase positive *Staphylococcus aureus* (ESBL-SA) and Methicillin-resistant *Staphylococcus aureus* (MRSA).^[31] *Vidanga* (*Embelia ribes*) seeds act as an anthelmintic.^[32]

Ela (*Elattaria cardamum*) is *kaphahara* (~subsides body humour). *Dhanyaka* (*Coriandrum sativum*) is useful in fighting infections.^[33] In an in vitro anti-inflammatory study, alcoholic extract of *Vacha* (*Acorus calamus*) rhizomes was highly effective in antifungal and antimicrobial activity. Beta asarone is highly effective for this antimicrobial activity.^[34] The wound healing activity of ethanol extract of *Vidanga* (*E. ribes*) in albino rats was found significant and showed faster epithelialization of wounds.^[35] The leaves, stem bark and fruit pulp of *Aragwadha* (*Cassia fistula*) was found to have antibacterial activity, the fruit pulp being the most potent. This activity was

attributed to the presence of Rhein which showed significant antibacterial activity against *Escherichia coli*, *Klebsiella aerogenes*, *Proteus vulgaris*, and *Pseudomonas aerogenes* (gram-negative bacteria) at 1000-5000ppm.^[36]

Different extracts and fractions of *Trikatu* (*Zingiber officinale*, *Piper nigrum*, *Piper longum*) possess antioxidant, anti-inflammatory, analgesic antimicrobial, antifungal, anthelmintic, antiallergic and immunomodulatory activities.^[37] Alcoholic and aqueous extracts of leaves of *Bhunimba* (*Andrographis paniculata* (Roxb.) Wall. Ex Nees showed antibacterial activity against *Staphylococcus aureus* and *E. coli*.^[38] All the drugs in this formulation are safe for pediatric use.

There are 3 major components in SCORAD: A) percentage of affected surface area, B) intensity of eczema at lesions, on a scale of 0 to 3, composed of erythema, oedema, excoriations, oozing, lichenification, and skin dryness, and C) functional impact evaluated by visual scale (0-10) composed of pruritus and sleep disturbance.^[39]

The 5 components of SIRS are blistering, exudate/pus, erythema/inflammation, itching/pain and crusting rating severity from 0-3. (Table 4). POEM score is composed of seven questions that relate to eczema symptoms that have occurred over the last week like itching, sleep loss, bleeding, oozing, cracking, dryness and flaking with a maximum score of 28. POEM is a weekly assessment score.

The minimum clinically important difference of SCORAD is about 8.6 points. Clinical success is when SIRS score is zero each for pus, crust and pain and 0/1 each for erythema and itching. The minimum clinically important difference for POEM is about 3. The skin lesions showed considerable improvement in two weeks. Pus discharge, pain itching and crusting reduced and sleep improved. After the treatment, SIRS score and Grading of *Kushta* turned zero which indicates that the infected lesions of the foot have completely healed. The severity of the skin lesions reduced as seen from the POEM score. This indicates that the management administered in the skin lesions has been successful in controlling the infection. When we consider the drugs of this formulation, almost all of these are of *Thiktha rasa* (~bitter taste) having the capacity of *Pithakaphaharatwa* (~alleviating *Pitha* and *Kapha* humors) and *Rakthashodhana* (~purification of blood), are *Kandugna* (~subsides itching), *Krimigna* (~antimicrobial), *Vranaropana* (promotes wound healing), *Twachya* (~improves skin health) and *Kushtahara* (~Reduces skin conditions) and also possess anti-inflammatory, analgesic, antimicrobial and antioxidant activity which aided easy healing of the infected skin lesions. During the course of treatment, there was no adverse effect in the patient.

Conclusion

This case study throws light upon the anti- infective properties and wound healing aspects of the unique drug specially meant for children in the management of pediatric dermatological conditions. The improvement in the clinical condition of the patient indicates that *Karikku Kashayam* is safe and effective in combating the infected phase of Atopic dermatitis.

Skin infection management protocol incorporating the use of tender coconut-based decoctions is a potential treatment approach for infected skin diseases. This case report shows that *Karikku Kashayam* which is prepared using tender coconut water is safe, ideal for paediatric use due to its nutritional, antioxidant and antimicrobial properties and is effective in controlling the infective stage of Atopic dermatitis.

Further clinical trials in large population and phytochemical analysis of *Karikku Kashayam* are to be planned to underline the effectiveness and composition of this tender coconut-based decoction.

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