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EXPLORING THE PHARMACOLOGICAL ACTIONS AND THERAPEUTIC POTENTIAL OF ULUVA THAILA: A SRI LANKAN TRADITIONAL MEDICINE RECIPE FOR NUTRITIONAL DEFICIENCY IN CHILDREN

Review article

[1]J S Anusara
[1]Demonstrator Faculty of Indigenous Medicine, University of Colombo, Sri Lanka.

ABSTRACT

Kaumarabhritya, an integral branch of Ayurveda, specializes in paediatric care within the ancient Indian medical system. Sri Lankan traditional medicine, deeply connected to Indian Ayurveda, demonstrates its authenticity in treating diverse diseases. This review aims to evaluate the efficacy of *Uluva Thaila*, a Sri Lankan traditional oil preparation, in managing *Mandam Roga* (nutritional deficiency) *in children. The study provides detailed insights into* various clinical approaches associated with *Mandam Roga* and assesses the suitability of *Uluva Thaila* for treatment according to Ayurvedic pharmacology and modern therapeutic aspects. The findings aim to contribute to the understanding of the application of Sri Lankan traditional medicine in paediatric nutrition, emphasising the need for evidence-based practices in this domain. This research involved a comprehensive study of online research articles, reports on Research Gate, PubMed, Google Scholar, and international research journals in Ayurveda and Traditional Medicine, specifically focusing on research papers related to *Mandam Roga* and nutritional deficiency. Additionally, authentic books in Ayurveda, Sri Lankan Traditional Medicine, *Thaila Panchashatahakaya*, Paediatrics, and the Ayurveda Pharmacopoeia were referenced. *Uluva thaila*, a traditional medicinal oil, is explored for its potential in addressing nutritional deficiencies. With ingredients such as fenugreek, recognized for high concentrations of calcium and phosphorus, its efficacy in promoting bone health, particularly in conditions like rickets, is suggested. The alignment of these ingredients with the principles of *mandam roga* supports its traditional use for nutritional deficiencies. A comprehensive analysis of *Uluva thaila* underscores its potential as a valuable resource for addressing nutritional imbalances, advocating for its inclusion in nutritional intervention strategies. The study concludes by strongly recommending further research into the pharmacological actions of *Uluva thaila* to enhance our understanding of its therapeutic potential.

Key Words: *Uluva Thaila*, *Mandam Roga*, Nutritional Deficiency, Paediatrics, Ayurveda, Sri Lankan Traditional Medicine

INTRODUCTION

Kaumarabhritya, a fundamental branch of Ayurveda, specializes in paediatric care within the ancient Indian medical system. Sri Lankan traditional medicine shares a profound connection with the Indian Ayurveda system, establishing its authenticity in treating diverse diseases. In paediatric care, Sri Lankan traditional medicine demonstrates effectiveness in addressing various disorders in children. However, the broader application of this traditional medicine faces a challenge due to the lack of robust evidence supporting its interventions. Despite the intricate relationship between Sri Lankan and

Indian medical systems, the need for high-quality evidence acts as a barrier to the extensive utilization of traditional medicine in the field of paediatrics. In Ayurveda, "*Kuposhana Janya Vikara*," (nutritional deficiencies) classified under nutritional diseases, specifically denotes growth and developmental deficiencies. [1] The consequences of nutritional deficiency during this critical stage extend beyond the physical well-being, significantly impacting a child's physical mental well-being [1]. In Ayurveda, "*Kuposhanaya*" signifies malnutrition, emphasizing undernutrition during childhood, marked by rapid growth and development, necessitating heightened nutrient utilization [2].

This condition can be correlated with various health issues such as Protein-Energy Malnutrition (PEM), marasmus, rickets, or chronic malabsorption conditions [1]. According to the Ayurveda "*kuposhanajanya roga*" can be further categorised into two classifications as "*agnimandya janitha*" (Impaired Digestion and Metabolism) and "*poshanamandya janitha roga*." [3] (Nutritional Deficiency) Examples of the *agnimandya janitha roga* include *Phakka roga* (emaciation and gross motor function deficit), *Parigarbhika roga* (Kwoshiorkor), *Pandu* (Anemia), *Krimi roga* (worm infestation), *Ajeerna* (Indigestion), while *Mandam* conditions and *ksheeraalasaka* (lactose intolerance) condition fall under the *poshanamandya janitha* (Nutritional Deficiency) category [3]. In the context of Sri Lankan traditional medicine, malnutrition-related diseases are specifically identified as "*Mandam roga*."[3] The term "*Mandam*" in Ayurveda signifies a deficiency or decrease, particularly concerning malnutrition [3]. Ayurveda interprets "*Mandam*" as a condition involving a reduction in the function of "*agni*" (digestive fire), referred to as *agnimandya* [3] (impaired digestion). This *agnimandya* condition results in impaired digestion, leading to malabsorption of nutrients from ingested food and ultimately affecting the formation of *dhatus* (body tissues) [1]. The insufficiency of essential nutrients has profound implications for health, function, and the overall development of individuals across the entire life cycle [4]. Inadequate intake of nutrients is linked to a spectrum of diseases and health issues. These encompass developmental defects, delays in both physical and cognitive development, heightened susceptibility to infectious diseases, and an elevated risk of poor health in adulthood [2]. This underscores the vital importance of addressing and rectifying micronutrient deficiencies to ensure healthy growth, development, and overall well-being. The *Thaila Panchashatahakaya*, a Sri Lankan traditional medical book, provides prescriptions for a wide range of traditional oil preparations for various diseases. Authored by Vaidyacharya Sadiris De Alvis Ileperuma, this compilation includes "*Uluva thaila"* [5], one of the oil preparations widely used for *mandam roga* in children by Sri Lankan Ayurveda paediatricians and this traditional remedy reflects the rich heritage of Sri Lankan traditional medicine in addressing malnutrition-related conditions in the paediatric population.

Aims & Objectives: The evaluation of *Uluva Taila*'s efficacy in managing *Mandam Roga* necessitates a comprehensive theoretical review, an

endeavour yet to be undertaken as of the present. The aim of this review is to address the existing knowledge gap, offering detailed insights into various clinical approaches associated with *Mandam roga*, including the utilisation of *Uluva Thaila* according to its original reference. Furthermore, the study also evaluates the suitability of *Uluva Thaila* for the treatment of *Mandam Roga* or in nutritional deficiency according to Ayurveda pharmacology and through the modern therapeutic aspect.

MATERIALS & METHODS: The research was done by studying online research articles, reports on Research Gate, PubMed, Google Scholar, and international research journals in Ayurveda and Traditional Medicine (encompassing research papers on *Mandam Roga* and nutritional deficiency). Additionally, reference was made to authentic books in Ayurveda, Sri Lankan Traditional Medicine, *Thaila Panchashatahakaya*, Paediatrics, and the Ayurveda Pharmacopoeia. The search terms employed were *Mandam Roga*, and nutritional deficiency in children.

Observations & Results: In Ayurveda, the main cause attributed to all diseases is the disturbance or malfunctioning of *Agni*, which refers to the digestive power and metabolism. According to Ayurvedic principles, proper digestion is crucial for maintaining overall health and well-being [5]. *Uluva thaila* which is prepared by the method of traditional oil preparation according to the recipe is used in *abhyanga* (for external application) and *pana* (internally) for the *mandam* condition to *agni deepana* or to stimulate the digestive power and metabolism [4]. By considering the main ingredients of *Uluva thaila* in accordance with Ayurveda *dravya guna vignana* (Ayurvedic pharmacodynamics and pharmacokinetics) it is explained as follow:

Table no 01: Description of the plant details

Ingredient	Botanical Name	Sanskrit Name	Family	Used Part
Uluhal	*Trigonella foenum-graecum L.*[6]	*Methi* [7]	Leguminosae[6]	Seeds
Karabuneti	*Syzygium aromaticum (L.) Merr. & L.M.Perry* [6]	*Lavanga* [7]	Myrtaceae[6]	Clove
Sadikka	*Myristica fragrans Houtt.* [6]	*Jathi phala*[7]	Myristicaceae[6]	Fruit
Vasavasi	*Myristica fragrans Houtt.* [6]	*Jathi kosha* [7]	Myristicaceae [6]	Fruit cover
Sududuru	*Cuminum cyminum L.* [6]	*Jeeraka*[7]	Apiaceae[6	Seeds
Kaluduru	*Nigella sativa L.* [6]	*Krishna Jeeraka*[7]	Ranunculaceae[6]	Seeds
Velmi	*Glycyrrhiza glabra L*.[6]	*Maduka*[7]	Leguminosae[6]	Rhizome
Koththamalli	*Coriandrum sativum L.* [6]	*Dhanyaka* [7]	Apiaceae[6]	Seeds

Asamodagam	*Trachyspermum ammi Sprague*[6]	*Yawani* [7]	Apiaceae[6]	Seeds
Thippili	*Piper longum Blume* [6]	*Kana*[7]	Piperaceae[6]	Fruit
Sudu lunu	*Allium sativum L.* [6]	*Lashuna*[7]	Alliaceae[6]	Bulb
Valangasal	*Embelia ribes Burm.f.* [6]	*Vidanga*[7]	Myrsinaceae[6]	Seeds
Thalathel	*Sesamum indicum L.* [6]	*Thila thaila*	Pedaliaceae[6]	Seeds oil

Table no 02: Pharmacological actions according to Ayurveda [8]

Ingredient	*Rasa*	*Guna*	*Virya*	*Vipaka*	*Prabhava*	*Doshanurupa karma*
Uluhal	*Katu thikta*	*Laghu Snigdha thikshna*	*ushna*	*katu*	-	*Kaphavatashamaka pittaprakopa*
Karabuneti	*Katu, Thiktha*	*Laghu, Snigdha, Thikshana*	*Sheeta*	*Katu*	-	*Kapha Pitta Shamaka*
Sadikka	*Katu, Thikta, Kashaya*	*Laghu Snigdha Thikshna*	*Ushna*	*Katu*	-	*Kapha Vata shamaka*
Vasavasi	*Katu, Thikta, Kashaya*	*Laghu Snigdha Thikshna*	*Ushna*	*Katu*	-	*Kapha Vata shamaka*
Sududuru	*katu*	*Laghu ruksha*	*ushna*	*katu*	-	*Kaphavatashamaka Pittavardhaka*
Kaluduru	*Katu thikta*	*Laghu Ruksha thikshna*	*ushna*	*katu*	-	*Kaphavatashamaka Pittavardhaka*
Velmi	*madhura*	*Guru snigdha*	*sheeta*	*madura*	-	*vatapittashamaka*
Koththamalli	*Madura Katu Thikta kashaya*	*Laghu snigdha*	*ushna*	*madhura*	-	*Thridoshashamaka specially pittashamaka*
Asamodagam	*Katu thikta*	*Laghu Ruksha thikshna*	*ushna*	*katu*	-	*Kaphavatashamaka Pittavardhaka*
Thippili	*katu*	*Laghu Snigdha thikshna*	*Anushna (ishath ushna)*	*madhura*	-	*Kaphavatashamaka Pittavardhaka*

Sudu lunu	*Madhura Lavana Katu Thikta kashaya*	*Snigdha Thikshna Pichchila Guru Sara*	*Ushna*	*Katu*	-	*Kaphavata shamaka Raktha vardhaka*
Valangasal	*Katu kashaya*	*Laghu Ruksha thikshna*	*ushna*	*katu*	-	*Kaphavatashamaka*
Thalathel [9]	*Katu Thikta Madhura Kashaya*	*Thikshna*	*ushna*	*Madhura*	-	*Thridoshanashaka*

Table no 03: Therapeutic Actions of the ingredients.

Name of the plant	Ayurveda Concept	Modern Concept
Uluhal	*Jwaraghna, Ruchikara, Deepana, Nadi balya, Balya, Shulahara, Vrushaya* [10]	Hypoglycaemic, Fungi- toxic, Insecticidal, Antibiotic, Antineoplastic, Anti-inflammatory, Antipyretic, Analgesic, Hypocholesterolaemic [12]
Karabuneti	*Shleshmaharai, Durgandhanashana, pachana* [11]	antimicrobial, antioxidant, antiviral, anaesthetic, antiparasitic, antioxidant action, antiperspirant action, antiseptic property, carminative action, deodorant, digestive disorders, rubefacient, immune-boosting, stomachic actions Alzheimer's disease [13]
Sadikka & Vasavasi	*mutra shodhana* [11]	aphrodisiac, hypolipidemic, antithrombotic, anti-platelet aggregation, antifungal, antidysenteric, anti-inflammatory activities, Hypoglycemic, anti-diabetic activities,Memory enhancing activity, hepatoprotective activity, aphrodisiac activity, osteoblast proliferation stimulation activity [14]
Sududuru	*vayasthapana* [11]	Antioxidant, anti-diabetic, digestive stimulant, anti-inflammatory, cardio-protective, gastro protective, immunomodulatory, anti-asthmatic action [15]
Kaluduru	*deepaniya* [11]	Antioxidant Activity, Antidiabetic Activity, Antihypertensive Activity, Neuroprotective Effects, Anti-Inflammatory and Analgesic Effects, Antimicrobial Activity, Antibacterial Activity, Antifungal Activity, Antiviral Activity,

		Antiparasitic Activity, Anticancer Activity, Aphrodisiac [16]
Velmi	*sandaniya, balya, kantya, kandughna, vamanopaga, asthapanopaga, chardinigrahana, mutraviranjaniya, purishaviranjaniya, angamardana prashamana, shonitha sthapana, rasayana* [11]	antidiabetic, antioxidant, anti-neurotic, anticoagulation, antimutagenic, antihemorrhoid, anti- inflammatory, anti-hepato toxic and antihyperlipidemic [17]
Koththamalli	*thrushnanigrahana, sheetaprashamana, vedana sthapana, pachana* [11]	antioxidant activity, diuretic, ant-diabetic, sedative, antimicrobial activity, anticonvulsant activity, hypnotic activity and anthelmintic activity and anti-mutagenic antioxidant, antidiuretic, anti-diabetic, sedative, anti-microbial, anticonvulsant, hypnotic activity, anthelmintic activity, anti mutagenic activity [18]
Asamodagam	*deepaniya, shula prashamana, vedana sthapana* [11]	antimicrobial, hypolipidemic, digestive stimulant, antihypertensive, hepatoprotective, antispasmodic, bronco-dilating, anti lithiasis, diuretic, abortifacient, galactagogue, antiplatelet-aggregatory, anti-inflammatory, antitussive, anti filarial, gastro-protective, nematicidal, anthelmintic, detoxification of aflatoxins, and ameliorative effects [19]
Thippili	*sheetaprashamana, shirovirechanopaga, hikkanigrahana, kasahara, shula prashamana, kasahara, pachana* [11]	Anticancer, Hepatoprotective, Antioxidant, Anti-inflammatory, Immunomodulatory Coronary vasodilation, Antimicrobial [20] Bioavailability-enhancing, Antiplatelet, Antifertility, Antihyperlipidemic, Antiobesity, Analgesic, Larvicidal, Adulticidal, Radio protective, Melanin-inhibiting, Cardio protective, Antidepressant, Antifungal, Anti-amoebic action [21]
Sudu lunu	*vedana sthapana* [11]	Antihypertensive, antimicrobial, fungicidal, Reduces Stress, Anthelmintic Activity, Antiplatelet Effect, Antihypertensive Activity, Anticancer Activity, Antifungal Activity, Antiviral Activity[22] Hyperlipidaemia,

		Antibacterial Activity, Cardiovascular Activity, Anti-Inflammatory Activity, Hepatoprotective Activity, Antioxidant Activity, Antidiabetic Activity [23]
Valangasal	*thruptighna, kushtaghna, krimighna, shirovirechanopaga, rasayana* [11]	Hepatoprotective, anti-inflammatory, antioxidant, antimitotic, radio protective, anticancer, contraceptive, anti-spermatogenic, anti-infective, antihyperlipidemic, antihyperglycemic, analgesic, antipyretic, and wound healing activity [24]

Analysing about the Ayurveda Pharmacology of the ingredients

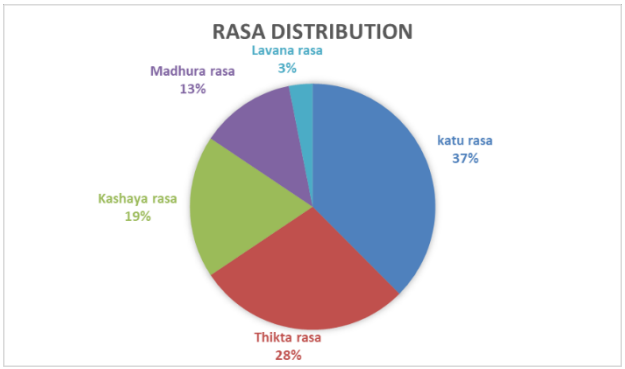

Chart no 01: Analysing of the *Rasas* of all the ingredients of the *Uluva Thaila*

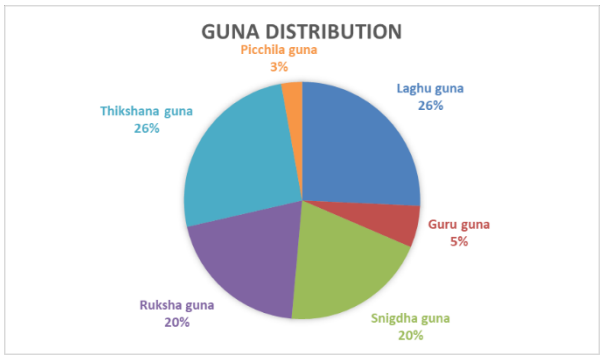

Chart no 02: Analysing the *Guna* (Qualities) of all the ingredients of the *Uluva Thaila*

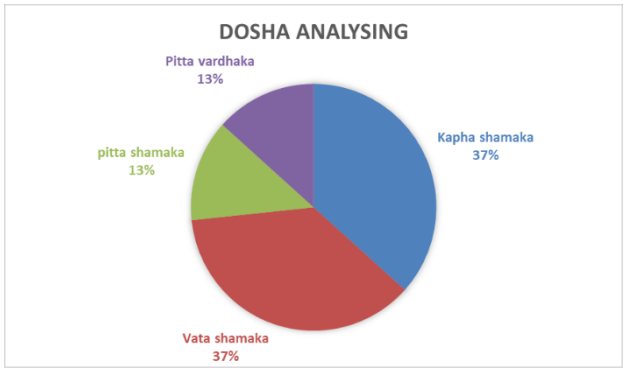

Chart no 03: Analysing of the *Doshanurupa Karma* of the *Uluva Thaila*

The Ayurvedic analysis of *Uluva thaila* emphasizes its balanced composition in terms of *rasa* (tastes), *guna* (qualities), *virya* (potency), and *vipaka* (post-digestive effects). With predominant *katu* (pungent), *thikta* (bitter), *kashaya* (astringent), and *madhura* (sweet) tastes, this traditional medicine aims to balance *Kapha* and *Pitta doshas* [25]. The *doshanurupa karma* (effect on *doshas*) reveals a focus on pacifying *Kapha* and *Vata*, while a smaller percentage contributes to increasing *Pitta*. This intricate combination aligns with Ayurveda principles, emphasizing the importance of *doshic* balance for overall well-being, particularly in digestion. *Uluva thaila* is regarded as a valuable traditional medicine, designed to promote digestive health and maintain equilibrium among the three *doshas*.

DISCUSSION: Nutritional deficiencies play a significant role in the manifestation of a range of health conditions and can have long-term consequences. Insufficient nutrient levels are particularly critical during periods of rapid growth and development, such as pregnancy, infancy, and childhood. Lack of proper nutrition during these stages can lead to irreversible impairments and health challenges [26].

According to the Concepts of Ayurveda Medicine: *Uluva thaila*, a traditional medicinal oil, is indicated for various conditions in children, including *mandama*. Other indications encompass anemic conditions, digestive disorders, worm infestation, jaundice, skin dryness, chest pain, fever, beriberi, indigestion, and edema[3]. The oil is described as a potent remedy, acting comprehensively from head to toe in children. According to Ayurveda, the primary cause of these conditions, including *mandam*, is *agni mandya* (digestive power impairment), specifically *jataragnimandya* [3]. This leads to a malfunction in the digestion and absorption of nutrients, hindering the nourishment and growth of body tissues. Whether due to *agni mandya* or insufficient nutrient intake (*poshanamandya*), these factors contribute to growth impairment, termed *wardhanamandya* [3]. Treatment focuses on *agni deepana*, enhancing digestive fire. Imbalances in *doshas*, especially aggravated *Kapha dosha*, can lead to *mandagni*, characterized by poor digestion and nutrient absorption [27]. This condition results in the accumulation of undigested food and toxins (*ama*)[27] .Restoring and balancing *agni*, particularly addressing *mandagni*, is crucial for overall health and disease prevention. In diseases caused by vitiated *Kapha*, Ayurveda recommends drugs with *Katu* (pungent), *Thikta* (bitter), and *Kashaya* (astringent) tastes, along with *Thikshna* (sharp), *Ushna* (hot), and *Snigdha* (unctuous) properties. For *Pitta* conditions, drugs with *Madhura* (sweet), *Thikta* (bitter), and *Kashaya* (astringent) tastes are recommended [27]. The balance of *doshas* relies on *agni*, emphasizing the need to maintain digestive power for disease prevention and treatment.

According to the modern concepts of nutritional value of the main ingredients: The primary ingredient of *Uluva thaila* is fenugreek, recognized for its rich composition of dietary fibers and essential nutrients crucial for growth and development. Fenugreek seeds contain carbohydrates, proteins, fats, fiber, minerals (potassium, magnesium, calcium, zinc, etc.), and essential vitamins [29]. Fenugreek proteins are particularly rich in aspartic acid and glutamic acid, contributing to nutrition, energy metabolism, and oxidative stress

regulation [30]. Research indicates various health benefits of fenugreek, including antidiabetic, anticancer, hypocholesterolemic, anti-inflammatory, antioxidant, and chemo preventive activities [31]. Sesame oil, the base oil for *Uluva thaila*, stands out for its nutraceutical properties, primarily attributed to polyunsaturated fatty acids (PUFA) [32]. Sesame oil also contains sesamolin, sesamin, tocopherol homologues, and other antioxidants [33]. The multifaceted properties of fenugreek and sesame oil, including their impact on cholesterol levels, anti-inflammatory and antioxidant effects, make them valuable additions with potential health-promoting benefits [34]. The traditional medicine oil recipe, *Uluva thaila*, shows efficacy in addressing Protein-Energy Malnutrition (PEM) [35], aligning with Ayurveda principles and modern nutritional analysis. It emerges as a holistic remedy, offering internal therapy for combating PEM. Furthermore, the incorporation of fenugreek and other ingredients in *Uluva thaila* suggests its potential efficacy in addressing bone-related conditions, such as rickets, due to its elevated levels of calcium and phosphorus. Understanding the intricate connections in digestive and nutritional processes is crucial for addressing malnutrition, particularly in childhood, to promote optimal health during critical developmental stages.

CONCLUSION: Malnourished children face a heightened susceptibility to severe infectious diseases, leading to increased morbidity and mortality rates. To mitigate these adverse consequences, preventing malnutrition is crucial, necessitating a comprehensive approach addressing both dietary aspects and infection risk. This review advocates for the utilization of *Uluva thaila*, a Sri Lankan traditional medicine recipe, in addressing nutritional deficiencies. With ingredients like fenugreek, rich in calcium and phosphorus, it holds potential for promoting bone health, especially in conditions like rickets. The alignment of these ingredients with *mandam roga* principles supports its traditional use. A thorough analysis underscores *Uluva thaila* as a valuable resource for addressing nutritional imbalances, providing a rationale for its inclusion in nutritional intervention strategies. Furthermore, strong recommendations are made for further research into the pharmacological actions of *Uluva thaila* to enhance evidence-based practices and integrate it into healthcare strategies for nutritional deficiency.

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Corresponding Author: Dr. J S Anusara
Demonstrator Faculty of Indigenous Medicine, University of Colombo, Sri Lanka.
Email: jsithmini@gmail.com

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