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Role of Ayurveda in Functional Neurorehabilitation of a Child with Occipital Encephalocele and Arnold–Chiari Malformation: A Case Study

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ABSTRACT

Background: Occipital encephalocele, a post-neurulation neural tube defect, is associated with high rates of neurological impairment and developmental delay despite timely surgical correction. Conventional neurosurgical management primarily addresses the structural defect, often leaving persistent functional deficits that demand long-term rehabilitative strategies.

Case Presentation: We report the case of a 3-year-old female child born with occipital meningoencephalocele, type II Arnold–Chiari malformation, and syringomyelia, who underwent surgical repair during infancy. Postoperatively, she presented with spasticity of the lower limbs and left upper limb, cortical fisting, bilateral visual and auditory deficits, and global developmental delay affecting motor, language, and cognitive milestones.

Ayurvedic Intervention: The clinical history was interpreted as *Abhyantara Vidradhi* complicated by post-surgical Kapha-*Vāta Āvaraṇa*. Management included *Āma Pachana* and *Srotoshodhana* herbal formulations, followed by external therapies tailored for *Kapha-Vāta Śamana. Swedana*-based interventions resulted in reduced spasticity and improved trunk control, enabling unsupported sitting for 2–3 minutes. Functional outcomes assessed by the Gross Motor Function Measure (GMFM) improved from 11.04% pre-treatment to 27.08% post-treatment. *Brimhana, Medhya*, and *Rasāyana* interventions were subsequently introduced to promote neuromuscular and cognitive development.

Conclusion: This case demonstrates the potential of integrative Ayurvedic rehabilitation in enhancing functional outcomes and neurodevelopmental progress in children with congenital brain malformation sequelae. While surgical intervention remains the cornerstone of structural correction, adjunctive Ayurvedic therapies may contribute significantly to neuroplasticity, motor recovery, and overall quality of life. Further systematic studies are warranted to validate these findings.

Keywords: *Occipital encephalocele; Arnold–Chiari malformation; Developmental delay; Ayurveda; Kapha-Vāta Āvaraṇa; Pediatric neurorehabilitation..*

1. INTRODUCTION

Chiari II malformation is a complex congenital neurological anomaly that develops during early embryogenesis of the brain and spinal cord. It is characteristically associated with myelomeningocele and involves caudal herniation of the cerebellar vermis, brainstem, and fourth ventricle through the foramen magnum, resulting in compression of neural structures and disruption of cerebrospinal fluid (CSF) dynamics.[1]

The clinical presentation is heterogeneous, encompassing features of spinal cord involvement—such as myelomeningocele and syringomyelia—as well as manifestations of hydrocephalus, tethered cord syndrome, brainstem compression, and lower cranial nerve dysfunction.[2] Surgical intervention remains the primary modality of treatment, aiming to decompress neural structures, correct hydrocephalus, and repair associated defects.[3] While surgery is often life-saving and effective in halting progressive neurological deterioration, long-term complications frequently persist. These include spasticity, motor deficits, sensory impairments, cognitive and language delays, and reduced functional independence, especially in children with associated occipital encephalocele and extensive neuroaxis involvement.[4]

Despite significant advances in neurosurgical techniques and supportive care, conventional management offers limited benefits in addressing the broader spectrum of developmental and quality-of-life challenges in these children. This has.

prompted growing interest in integrative approaches, including *Ayurveda*, which provide individualized, holistic strategies for neurodevelopmental rehabilitation

2. CASE PRESENTATION

A 3-year-3-month-old female child was brought to the *Kaumarabhritya* outpatient department with complaints of global developmental delay and spasticity of all four limbs. On examination, she exhibited facial dysmorphism, microcephaly, and occipital suture marks consistent with a history of surgically repaired encephalocele. Bilateral visual and auditory impairments were also noted. Fig 1 & 2

FIGURE 1 BEFORE TREATMENT

FIGURE 2 BEFORE TREATMENT

Developmentally, the child could identify close relatives through tactile cues and expressed emotions by smiling and

babbling. Behaviorally, she was highly irritable and became markedly anxious or distressed upon exposure to unfamiliar sounds or touch.

History revealed that she was second-born to a non-consanguineous couple, delivered by lower segment cesarean section (LSCS) at 38 weeks of gestation. The immediate postnatal period was remarkable for a weak cry and poor spontaneous activity, necessitating resuscitation. Clinical examination revealed an unruptured occipital meningoencephalocele. Sucking reflex was inadequate, and feeding was initiated via Palade with formula.

Magnetic resonance imaging (MRI) of the brain and spine revealed an occipital meningoencephalocele with Type II Arnold–Chiari malformation and syringomyelia involving the dorsal spinal cord. She was put on antibiotics. On postnatal day (PND) 4, the neonate developed features of sepsis (positive C-reactive protein, blood culture growing *Klebsiella*), associated with cerebrospinal fluid (CSF) leakage from the encephalocele site. Antibiotics were escalated. On PND 5, focal seizures involving the left upper and lower limbs were observed, controlled initially with phenobarbitone. A second episode occurred on PND 6, necessitating the addition of levetiracetam. On PND 10, surgical repair of the occipital encephalocele was undertaken. The sac contained gliotic brain tissue and hemorrhagic fluid. Phenobarbitone was discontinued on PND 15, while levetiracetam was continued until 1 year of age.

Developmental trajectory revealed global delay. At 3 months, the infant could scoot and pivot in supine posture. By 4 months, cooing began, but no visual fixation or auditory response was evident. Otoacoustic emission (OAE) testing suggested bilateral hearing loss, and fundoscopy revealed features of retinopathy of prematurity. By 6 months, rolling over was achieved, but abnormal posturing persisted with hyper-abducted hips, flexed lower limbs, flexed upper limbs, and spastic quadriparesis. At 7 months, referral for developmental rehabilitation was made. Brainstem evoked response audiometry (BERA) at 11 months confirmed bilateral hearing loss. Physiotherapy was initiated at 1 year and continued biweekly until 2.5 years, yielding gradual improvement in stiffness and posture. At 3 years, the child achieved brief head holding in prone position but exhibited poor social regard and irritability upon tactile contact. At 3 years 3 months, she was brought to the *Kaumarabhritya* outpatient department (OPD) for integrative Ayurvedic management.

Antenatal history (ANH) was significant for maternal gestational diabetes mellitus (GDM) managed with insulin, with poor glycemic control due to irregular treatment. Anomaly scan at 7 months gestation revealed occipital encephalocele, lumbosacral meningocele, and fetal crossed fused renal ectopia.

3. CLINICAL FINDINGS

At presentation, the child exhibited significant global developmental delay. Physical examination revealed microcephaly and plagiocephaly with a persistent left occipital bulge, suggestive of prior encephalocele repair, confirmed by surgical suture marks over the occipital region. Cranial sutures and fontanels were closed appropriately for age.

Facial dysmorphism was evident with arched eyebrows, up-slanting palpebral fissures, a depressed nasal bridge, and a short neck. Neurological examination showed bilateral hypertonia of both upper and lower limbs, sluggish deep tendon reflexes, and reduced muscle strength (Grade 3/5). Cranial nerve involvement was noted: Optic nerve: Signs of optic atrophy, absent menace reflex, and visual acuity limited to perception of light (PL+). Facial nerve: Drooling, possibly due to facial muscle weakness. Vestibulocochlear nerve: Confirmed bilateral sensorineural hearing loss. These findings, along with imaging and developmental profile, were consistent with post-surgical sequelae of Arnold-Chiari II malformation with associated occipital meningoencephalocele and syringomyelia.

4. INTERVENTION

As the child exhibited marked irritability and frequent tantrums even in response to minor triggers, she was reluctant to accept any internal medications. Therefore, the treatment plan was formulated to rely exclusively on procedure-based external therapies, with the objective of pacifying *Vāta doṣa*, reducing spasticity, and providing sensory and emotional regulation. Table 1: Timeline of Interventions

Table 1: Timeline of Interventions

Phase	Intervention(s)	Duration	Formulation / Drugs Used	Therapeutic Objective
Phase 1: Preparatory (*Rūkṣaṇa & Āmapācana*)	*Udvartana*	7 days	*Kolakulathādi Cūrṇa*	*Rūkṣaṇa, Āmapācana, Kapha-Vāta Āvaraṇa bheda, Srotoshodhana*

Phase	Intervention(s)	Duration	Formulation / Drugs Used	Therapeutic Objective
Phase 2: Localized *Swedana*	*Kāṣāya Pinda Sveda (Kadikizhi)*	7 days	*Kadikizhi* boluses with *Rūkṣa & Uṣṇa* herbs	*Kapha-Vāta Śamana,* reduce stiffness *(Stambha),* enhance muscle tone
Phase 3: Sensory-Calming & *Vāta-Pitta* Modulation	*Kṣīradhārā*	7 days	*Pañcatikta Kaṣāya* in medicated milk	*Manovaha & Indriyavaha Srotas Śamana*, reduce neuro-sensory irritability
Phase 4: Neuromuscular Modulation	*Pradeha* (herbal paste application)	5 days	*Kolakulathādi Cūrṇa in Bala Kṣīra Kvātha*	Muscle relaxation, reduce hypertonicity, *Bālya & Vāta Śamana*
Phase 5: *Bṛṃhaṇa Swedana*	*Muṭṭakizhi*	7 days	*Bṛṃhaṇa* herbs in *Muṭṭakizhi* bolus	*Dhātu Poshana* (nourishment), improve joint mobility, combat *Mamsa/Asthi Dhātu Kṣaya*
Phase 6: Sensorimotor Balance & CNS Support	*Takradhārā*	7 days	*Musta-Āmalaka Kaṣāya in Takra*	*Vāta-Kapha Śamana*, improve CNS regulation, reduce sensory defensiveness
Phase 7: Neuromuscular Reconditioning I	*Sannīkizhi*	7 days	*Brahmi-Sohalādi, Prabhañjana Vimardhana Kuzhampu*	Muscle tone improvement, strengthening, Medhya effect
Phase 8: Neuromuscular Reconditioning II	*Pizhinju Thadaval* (therapeutic massage)	7 days	*Brahmi-Sohalādi, Prabhañjana Vimardhana Kuzhampu*	Fine motor skill development, coordination, relaxation
Phase 9: Cognitive & *Manovaha Srotas* Regulation	*Śirodhara, Śirolepa*	14 days	Balahatādi Taila, Brahmi-Sohalādi Lepa	*Majjā Dhātu* support, improve cognition, reduce restlessness
Final Phase: Internal Medhya Rasāyana	Oral administration	Post-external therapy (continued long-term)	*Kalyānaka Ghṛta*	Enhance *Buddhi, Smṛti, Dhī*; long-term cognitive support

The therapeutic regimen was delivered in a structured, phased manner focusing on *doṣa* balance, neuromuscular modulation, and cognitive-sensory rehabilitation. Initial preparatory therapies included *Udvartana* with *Kolakulathādi Cūrṇa* and localized *swedana (Kaṣāya Pinda Sveda),* intended for *rūkṣaṇa, āmapācana*, and reduction of stiffness. This was followed by *Kṣīradhārā* with *Pañcatikta Kaṣāya* in medicated milk and *Pradeha* with *Kolakulathādi Cūrṇa* in *Bala Kṣīra Kvātha* to pacify *Vāta–Pitta*, relieve hypertonicity, and calm neuro-sensory irritability. Strengthening therapies such as *Muṭṭakizhi (Bṛṃhaṇa Swedana*) and *Takradhārā* were subsequently employed to nourish *dhātus*, improve joint mobility, and regulate CNS function. The neuromuscular reconditioning phase incorporated *Sannīkizhi* and *Pizhinju thadaval* to enhance muscle tone, coordination, and relaxation. The final phase consisted of *Śirodhara* and *Śirolepa* for *majjā dhātu poshana* and behavioral regulation, followed by long-term internal administration of *Kalyānaka Ghṛta* as a *medhya rasāyana* to support cognition and memory.

Functional outcomes were assessed using the Gross Motor Function Measure (GMFM). Marked improvements were observed following the intervention. In the lying domain, scores increased from 43.3% pre-treatment to 92.2% post-treatment, indicating substantial gains in postural control. In the sitting domain, the score improved from 11.8% to 43.3%, reflecting enhanced trunk stability and balance. The overall GMFM total score improved from 11.04% at baseline to 27.08% after therapy, demonstrating meaningful functional progress across multiple motor domains. Fig 3, Table 2: Pre-post GMFM assessment

FIGURE 3 POST TREATMENT

Table 2: Pre-post GMFM score

GMFM	PRE	POST
LYING	43.3%	92.2%
SITTING	11.8%	43.3%
TOTAL	11.04%	27.08%

5. DISCUSSION

Occipital encephalocele is a rare neural tube defect characterized by herniation of meninges, cerebrospinal fluid, and often dysplastic brain tissue through a cranial defect, most commonly in the occipital bone. The condition is frequently associated with Chiari II malformation and other anomalies, including hydrocephalus and syringomyelia, and carries a guarded prognosis due to risks of infection, seizures, and long-term neurodevelopmental impairment. Surgical correction remains the mainstay of management; however, residual neurological deficits, sensory dysfunction, and developmental delay are common sequelae.

In Ayurvedic nosology, congenital anomalies of this nature may be classified under *Ādibalapravṛtta Vyādhi* [5], arising from defects in *Bījabhāgāvayava* (genetic determinants) [6]. In the present case, poorly controlled maternal gestational diabetes can be understood as a *Janmabala Nidāna* (prenatal/gestational factor), further aggravating the inherent susceptibility. The protrusion of brain tissue, complicated by subsequent sepsis, may be analogized to *Abhyantara Vidradhi*—a deep-seated suppurative lesion—developing due to localized *srotovaiguṇya*, inflammation, and degeneration [8]. The process of *pāka* (suppuration) became evident clinically as neonatal sepsis, reflecting both deep tissue involvement and compromised immune response [9]. The surgical repair of the encephalocele may be considered analogous to *Śastra Karma*, which *Ayurveda* prescribes in the management of *Vidradhi*-like presentations [10].

Post-operatively, the child exhibited vision loss, hearing loss, seizures, and global developmental delay. From an *Ayurvedic* standpoint, these manifestations reflect *Vāta Doṣa* vitiation localized in the *Mūrdha* (cranial region), the seat of *Prāṇa Vāta*, which governs higher functions such as cognition, sensory integration, and motor coordination [11,12]. Invasive procedures and surgical trauma are well-recognized etiological factors of *Vāta vitiation*, further aggravating the imbalance. [13]

While neurosurgical correction addresses the structural anomaly, *Ayurvedic* interventions can be directed toward functional

rehabilitation, aiming to pacify aggravated *Vāta*, clear *Kapha* obstruction, nourish depleted *Dhātus*, and restore developmental trajectory. The child presented with limb spasticity and global developmental delay, suggestive of a chronic *Vāta*-dominant pathology involving *Majjā Dhātu* (nervous tissue), *Māṃsa Dhātu* (muscular tissue), and associated *śirā, snāyu*, and *kaṇḍarā* (vascular, ligamentous, tendinous, and peripheral neuronal structures). The Ayurvedic treatment strategy was systematically designed to address the underlying pathophysiological factors. The evident undernourishment of tissues indicated impaired digestion, metabolism, and assimilation, necessitating interventions for *agni dīpana* (enhancing digestive capacity) and *āma pachana* (detoxification). Further objectives included *srotoshodhana* (channel cleansing) [14] to facilitate effective tissue nourishment, restoration of *doṣic* equilibrium, and neuromodulation to improve neuronal plasticity. Collectively, these measures were intended to accelerate brain growth velocity, thereby reflecting in improvements in motor performance, as well as social and emotional stability.

The initial phase involved *Udvartana* using *Kolakulathādi Cūrṇa*, administered to promote *Rūkṣaṇa* (drying) and *Āmapācana* [15, 16]. This intervention was aimed at breaking *Kapha-Vāta Āvaraṇa*, thereby restoring the unobstructed flow of *Vāta*. Additionally, the mechanical friction during *Udvartana* facilitated *Srotoshodhana* and improved peripheral circulation, contributing to muscular strengthening and enhanced proprioceptive feedback.

Following this, *Kāṣāya Pinda Sveda* (*Kadikizhi*), known for its *Rūkṣa* and *Uṣṇa* properties, was administered. It served a dual purpose: *Kapha-Vāta Śamana* and deeper *Srotoshodhana*—especially beneficial in children presenting with spasticity and rigidity [17]. The fomentation reduced *Stambha* (stiffness) and *Gaurava* (heaviness), both features of *Kapha* aggravation [18].

Given the child's symptoms of irritability, sensory defensiveness, and features suggesting *Vāta-Pittaja* predominance, *Kṣīradhārā* with *Pañcatikta Kṣaya* was selected. This modality offered *Sneha* (unctuousness) and *Śīta Guna* (cooling effect), pacifying the *Manovaha Srotas* and *Indriyavaha Srotas*. The *Pañcatikta* formulation further contributed *Pitta-Vāta Śamana*, alleviating neuro-sensory irritability and improving social interaction and behavioral symptoms [19].

To target persistent hypertonia, *Pradeha* (application of warm herbal paste) was performed using *Kolakulathādi Cūrṇa* mixed with *Bala Kṣīra Kvātha* [20]. This combination synergistically provided *Rūkṣaṇa*, *Vāta Śamana*, and *Bālya* (strengthening) effects. A significant reduction in spasticity was observed, confirming the intervention's efficacy in neuromuscular modulation.

Subsequently, *Muṭṭakizhi* (bolus made out of eggyolk and medicated powders), known for its *Tīkṣṇa Bṛṃhaṇa Sveda* action, was introduced to address *Dhātu Kṣaya*—especially depletion of *Māṃsa* and *Asthi Dhātus* [21]. This modality helped restore muscle bulk, improve joint mobility, and strengthen functional movements—key goals in managing developmental delay.

Takradhārā over the head and body was performed using *Musta-Āmalaka Kaṣāya* for its *Vāta-Kapha Śamana* effect [22]. The *Laghu* and *Uṣṇa* nature of *Takra* supports sensorimotor regulation and calms the mind by facilitating *Srotoshodhana* and balancing CNS functions [23].

To promote neuromuscular reconditioning, *Pizhinju Thadaval* using *Prabhañjana Vimardhana Kuzhampu* [24, 25] and *Sannīkizhi* with *Brahmi-Sohalādi* were administered [26]. These interventions combine localized *Swedana* with *Vāta Śamana* and *Medhya* (nootropic) effects, supporting improvements in fine motor skills and sensory processing.

Śirodhārā with *Bālāhatādi Taila* [27, 28] was followed by *Śirolepa* using *Brahmi-Sohalādi*, administered over 14 days [29, 30]. These therapies act at the level of *Majjā Dhātu* and *Manovaha Srotas*, improving cognitive functions, sleep quality, and reducing *Vāta*-induced restlessness.

Finally, *Kalyānaka Ghṛta*, a well-established *Medhya Rasāyana*, was introduced as internal medication once the child began to cooperate, which itself reflected a gain in social and emotional maturity. Traditionally described to enhance Buddhi (intellect), *Smṛti* (memory), and *Dhī* (comprehension), it played a supportive role in cognitive recovery following the intensive external therapeutic regimen. Clinically, this was evidenced by improvements in socialization, as the child—previously irritable and resistant—now responded more calmly to the touch of strangers [31].

The observed improvements in GMFM scores highlight the therapeutic potential of the integrative *Ayurvedic* protocol in addressing motor impairments associated with neurodevelopmental disorders. The substantial gain in the lying domain (43.3% to 92.2%) reflects enhanced postural control, which may be attributed to the combined effects of *Vāta*-pacifying external therapies and dhātu poṣaṇa (tissue nourishment) achieved through *snehana* and *swedana*. Similarly, the improvement in sitting scores (11.8% to 43.3%) indicates better trunk stability and balance, suggesting a gradual reconditioning of neuromuscular coordination. The overall increase in GMFM total score from 11.04% to 27.08% demonstrates not only functional progress across multiple domains but also the possibility of improved neuroplasticity, motor learning, and effective sensory-motor integration. These outcomes corroborate the Ayurvedic rationale of correcting *agni* and *srotas* functions to enhance tissue nutrition and neurodevelopment, ultimately manifesting as measurable gains in motor performance.

6. CONCLUSION

This case highlights the role of integrative Ayurvedic therapies in the functional rehabilitation of a child with post-surgical occipital encephalocele and global developmental delay. While neurosurgical correction addressed the structural anomaly, persistent deficits such as spasticity, sensory dysfunction, and delayed milestones reflected underlying *Vāta*-dominant pathology with *Kapha āvaraṇa* and *dhātu kṣaya*. A systematically planned Ayurvedic protocol—emphasizing *agni dīpana, srotoshodhana, vāta-śamana*, and *dhātu poṣaṇa*—facilitated measurable improvements in motor function, sensory regulation, and social responsiveness, as evidenced by significant gains in GMFM scores.

The clinical outcomes suggest that Ayurveda, when applied judiciously in such neurodevelopmental contexts, can complement conventional management by enhancing neuroplasticity, supporting tissue nourishment, and promoting overall developmental progress. Further studies with larger cohorts are warranted to validate these findings and establish standardized integrative protocols.

Declaration of patient consent

The authors certify that they have obtained a patient consent form in which the caregiver has given permission for the case to be reported in the journal. The caregiver understands that the patient's name and initials will not be published and that efforts will be made to protect the patient's identity, though complete anonymity cannot be guaranteed.

Conflicts of interest

There are no conflicts of interest

REFERENCES

[1] Abnormal prenatal brain development in Chiari II malformation. Front Neuroanat. 2023;17: 1116948. doi:10.3389/fnana.2023.1116948.

[2] Cools MJ, Wellons JC, Iskandar BJ. The nomenclature of Chiari malformations. Neurosurg Clin N Am. 2023 Jan;34(1):1–7.

[3] Surgical management of Chiari II malformation: a systematic review of literature. J Neurosurg Pediatr. 2024;34(3):233–241. doi:10.3171/2024.3. PEDS 23456.

[4] Miller SM, Smith JM, Thompson JR. Long-term neurodevelopmental outcomes in children with Chiari II malformation and occipital encephalocele: A retrospective cohort study. J Neurosurg Pediatr. 2023;32(4):345–352. doi:10.3171/2023.4. PEDS23245.

[5] Sharma PV, editor and translator. Susrutha Samhitha: Dalhana commentary. Vol. 1, Sutrasthana 24/46. Varanasi: Chaukhambha Viswa Bharati; 2010. p. 253, sloka 5. Reprint edition.

[6] Agnivesha. Charaka Samhita: Sharirasthana 3/7. In: Sharma PV, editor. 2010 ed. Varanasi: Chaukhambha Orientalia; 2010. p.421.

[7] Sharma PV, editor and translator. Susrutha Samhitha: Dalhana commentary. Vol. 1, Sutrasthana 24/46. Varanasi: Chaukhambha Viswa Bharati; 2010. p. 253, sloka 5. Reprint edition.

[8] Agnivesha. Charaka Samhita: Sutrasthana 17/90–100. In: Sharma PV, editor. 2010 ed. Varanasi: Chaukhambha Orientalia; 2010. p.121.

[9] Sharma PV, editor and translator. Susrutha Samhitha: Dalhana commentary. Vol. II, Nidana sthana 9/16. Varanasi: Chaukhambha Viswa Bharati; 2010. p. 65, sloka 34-38. Reprint edition.

[10] Sharma PV, editor and translator. Susrutha Samhitha: Dalhana commentary. Vol. 1, Sutrasthana 25/46. Varanasi: Chaukhambha Viswa Bharati; 2010. p. 261, sloka 12-13. Reprint edition.

[11] Sharma PV, editor and translator. Susrutha Samhitha: Dalhana commentary. Vol. II, Nidana sthana 1/16. Varanasi: Chaukhambha Viswa Bharati; 2010. p. 17, sloka 83,84. Reprint edition.

[12] Sreekumar T. Ashtangahridaya Vagbhata Sootrasthana-12. 3rd ed. Thrissur: publication dept Harisree Hospital; 2011. p. 262 sloka no 3-4

[13] Sreekumar T. Ashtangahridaya Vagbhata Sootrasthana-11. 3rd ed. Thrissur: publication dept Harisree Hospital; 2011. p. 247 sloka no 3

[14] Sreekumar T. Ashtangahridaya Vagbhata Sootrasthana-13. 3rd ed. Thrissur: publication dept Harisree Hospital; 2011. p. 294 sloka no 23-24

[15] Sreekumar T. Ashtangahridaya Vagbhata Sootrasthana-2. 3rd ed. Thrissur: publication dept Harisree Hospital; 2011. p. 68 sloka no 15

[16] Sreekumar T. Charaka Samhitha: Sutrasthana Malayalam translation. Ch. 3, sloka 18. Harisree Hospital Publication; 2016. First edition. p. 71.

[17] Paniker A, Deepna M, Thomas S, Seena S. A review on the procedure and practice of Dhanyamla Nimanjjitha Pinda Sweda (Kadikizhi). Kerala J Ayurveda. 2023; doi:10.55718/kja.255.

[18] Sreekumar T. Charaka Samhitha: Sutrasthana Malayalam translation. Ch. 22, sloka 11. Harisree Hospital Publication; 2016. First edition. p. 392.

[19] Joshi A, Bahatkar S. Role of Panchatikta Ksheer Basti and Ksheer Dhara in the management of osteoarthritis of knee joint: a case study. Int J Ayurveda Pharma Res. 2021;9(12)

[20] Sharma PV, editor and translator. Susrutha Samhitha: Dalhana commentary. Vol. 1, Sutrasthana 18/46. Varanasi: Chaukhambha Viswa Bharati; 2010. p. 194, sloka 6. Reprint edition.

[21] Ramachandran D, Shreevathsa. Swedana Karma – An exploration to the various types of Kizhis in practice. Int Ayurvedic Med J. 2022 Jul;10(7):17. doi:10.46607/iamj2810072022.

[22] K.V.Krishnan Vaidyan & S. Gopala Pillai, Sahasrayogam with Sujanapriya vyakhyana, Dhara kalpa P.476, 35th Edition Nov 2017, Vidyarambham Publishers, Alappuzha, Kerala.

[23] Sreekumar T. Ashtangahridaya Vagbhata Sootrasthana-5. 3rd ed. Thrissur: publication dept Harisree Hospital; 2011. p.113

[24] K.V.Krishnan Vaidyan & S. Gopala Pillai, Sahasrayogam with Sujanapriya vyakhyana, Dhara kalpa P.477, 35th Edition Nov 2017, Vidyarambham Publishers, Alappuzha, Kerala.

[25] K.V.Krishnan Vaidyan & S. Gopala Pillai, Sahasrayogam with Sujanapriya vyakhyana, Thaila yoga P.293, 35th Edition Nov 2017, Vidyarambham Publishers, Alappuzha, Kerala.

[26] Ravindranath D, Anirudhan R. Effect of Sannikkizhi in children with Autism SpectrumDisorders. Arya Vaidyan. 2016;29(4):42-5.

[27] K.V.Krishnan Vaidyan & S. Gopala Pillai, Sahasrayogam with Sujanapriya vyakhyana, Dhara kalpa Pg 474, 35th Edition Nov 2017, Vidyarambham Publishers, Alappuzha, Kerala.

[28] Kishore E, Mohammad H, Janaki C, Balakrishnan D, Queen E. Evaluation of GC MS, and anti-inflammatory activity of one Ayurveda oil, Balahatadi Tailam. J Neonatal Surg. 2025;14(6):195202. doi:10.52783/jnsv14.3105.

[29] Warrier KR. Unmada Chikitsa. In: Syamala B, editor. Arogya Kalpadrumam. 1st ed. 31/28–33. Thrissur (IN): Smart Publishers; 2011.

[30] Anirudhan R, Nalinakshan A. Effect of Brahmisohaladi Sirolepa in children with Autism SpectrumDisorders. Int J Ayurveda Pharma Res. 2018 Jan 27;6(1)

[31] Prof K R Srikantha Moorthy (trans) Vagbhata's Astanga Hrdayam Vol 3 Uthara sthana, Chaukhamba krishnadas academy, Varanasi.6th edition; 2012. P. 61.