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"CONCEPTUAL AND COMPARATIVE CLINICAL STUDY OF EFFICACY OF *MUSTADI KWATHA* IN *PANDU* AND *SHOTH* IN THE PURVIEW OF"-"*SANTARPANOUTHANAM APATARPANAM AUSHDHAM*"

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ABSTRACT

The Ayurvedic principle of *Santarpanothanam Apatarpanam Aushadham* posits that diseases arising from over-nutrition (*Santarpanotha Vyadhi*) should be treated with depleting therapies (*Apatarpana*). Pandu (anemia) and Shoth (edema) are distinct clinical entities sharing this common etiological root, characterized by *Agni* impairment, *Ama* formation, and *Srotorodha* (channel obstruction). Mustadi Kwatha, a classical polyherbal formulation, is indicated for such conditions. Objective is to conduct a comprehensive clinical evaluation of Mustadi Kwatha's efficacy in Pandu and Shoth, correlating its therapeutic action with the core pathophysiology of *Santarpanotha Vyadhi*. An open, comparative clinical trial was conducted on 100 patients (50 with Pandu, 50 with Shoth). Both groups received Mustadi Kwatha (decoction of 25g coarse powder) at a dose of 1 *Pala* on an empty stomach for 60 days. Assessment utilized subjective symptom scoring and objective parameters (CBC, ESR, LFT, RFT). Statistical analysis was

performed using Wilcoxon signed-rank and paired/unpaired ‘t’ tests. Mustadi Kwatha effectively manages both Pandu and Shoth by acting on the shared pathophysiology of *Santarpanotha Vyadhi*. Its efficacy lies in correcting *Agni*, eliminating *Ama*, and clearing *Srotas*, thereby reducing systemic inflammation. The study robustly validates the classical principle of Apatarpana therapy for over-nutrition-related disorders, offering a rational treatment approach for anemia and edema associated with metabolic dysfunction.

KEYWORDS: Pandu, Shoth, Anemia, Edema, Mustadi Kwatha, Santarpana, Apatarpana, Ayurveda.

1. INTRODUCTION

Ayurveda’s genius lies in its ability to classify and manage diseases based on fundamental etiological principles rather than just symptomatic presentation. Among its most profound classifications is the division of disorders into **Santarpanotha** (arising from over-nutrition) and **Apatarpanotha** (arising from under-nutrition). This dichotomy forms a cornerstone of Ayurvedic therapeutics, with the guiding principle being *"Santarpanothanam Apatarpanam Aushadham"*—the medicine for diseases caused by over-nutrition is under-nutrition.[1]

Santarpanotha Vyadhi is not simply a state of excess. It is a complex pathological process triggered by the habitual intake of *Guru* (heavy), *Snigdha* (unctuous), *Madhura* (sweet), and *Abhishyandi* (channel-obstructing) foods, coupled with a sedentary lifestyle.[2] This leads to a cascade of events: impairment of *Agni* (digestive and metabolic fire), the formation of *Ama* (a toxic, incompletely metabolized substance), vitiation of *Kapha Dosha* and *Meda Dhatu* (adipose tissue), and subsequent obstruction of *Srotas* (microchannels). The result is a spectrum of disorders that, despite their diverse clinical presentations, share a common root. Modern science resonates with this concept, linking chronic over-nutrition and sedentary habits to metabolic syndrome, a cluster of conditions including obesity, dyslipidemia, and insulin resistance.[3]

Pandu and **Shoth** are two such disorders, seemingly disparate but united by their Santarpanotha origin. Pandu, characterized by *Pandutva* (pallor), is primarily a disorder of *Rasa* and *Rakta Dhatu*, where the formation of healthy blood is compromised. It can be correlated with anemia, particularly the type associated with chronic inflammation, where adequate iron stores are present but their utilization is blocked.[4] Shoth, defined as *Utsedha* (bulging) due to fluid accumulation, is a disorder of *Rasa Dhatu* and *Medo Dhatu* where

metabolic dysfunction leads to interstitial fluid retention.[5] It correlates with edema, especially in the context of metabolic syndrome where low-grade inflammation and lymphatic dysfunction are key players.

While modern medicine offers targeted interventions like iron supplements for anemia and diuretics for edema, these often fail to address the root cause and may provide only temporary relief. In the Ayurvedic context, a more holistic, root-cause-based approach is needed. **Mustadi Kwatha**, a classical formulation from the Charaka Samhita (Sutra Sthana 23/13-14), is specifically indicated for *Santarpanajanya Vyadhi*.[6] Composed of a synergistic blend of 13 herbs, it is designed to act as an Apatarpana therapy.

This study was undertaken to delve deeper into the classical principle of Apatarpana. The primary objective was to conceptually analyze the nuanced etiopathogenesis of Santarpanotha Vyadhi, with a specific focus on Pandu and Shoth. The secondary, and more significant, objective was to provide a robust clinical revalidation of Mustadi Kwatha's efficacy in both conditions, correlating its therapeutic actions with the core pathophysiological disruptions of Agni, Ama, and Srotas.

2. MATERIALS AND METHODS

2.1. Study Design and Setting: An open, comparative, interventional clinical trial was conducted at Mahaveer Ayurvedic Medical College and Hospital, Meerut, over a duration of two months.

2.2. Patient Selection and Ethics: A total of 105 patients were registered, and 100 completed the study (50 in each group). The study was approved by the Institutional Ethics Committee, and all patients provided written informed consent. They were enrolled from the OPD and IPD of the hospital.

2.3. Inclusion and Exclusion Criteria

- **Inclusion Criteria**

❖ Age between 15-60 years, of either sex.

❖ Patients presenting with the classical signs and symptoms of Pandu or Shoth as per Ayurvedic texts.

❖ For Pandu group: Hemoglobin level between 6 and 10 g/dL.

❖ Willing to provide informed consent.

- **Exclusion Criteria**

❖ Hereditary diseases (e.g., sickle cell anemia, thalassemia).

❖ Pregnancy and lactation.

❖ Infectious or traumatic causes of anemia and edema (e.g., *Abhighataj Shoth*).

❖ Chronic disease for more than 10 years.

❖ Any acute illness, or patients who developed adverse drug reactions during the trial.

2.4. Intervention and Grouping: Patients were divided into two groups:

- **Group A (Pandu, n=50):** Administered Mustadi Kwatha internally.
- **Group B (Shoth, n=50):** Administered Mustadi Kwatha internally.

The drug was prepared from a coarse powder (*Yavakuta*) of the 13 ingredients. The decoction (*Kwatha*) was prepared by boiling 25g of this powder in 400 ml of water (16 times) until the volume reduced to 50 ml (1/8th). Patients were instructed to take this 1 *Pala* (approx. 48 ml) decoction on an empty stomach in the morning for a period of 60 days. No other medication, internal or external, was permitted.

2.5. Ingredients and Rationale: The 13-ingredient formulation is designed to act synergistically as an Apatarpana drug.

Sr. no.	Drug Name (Sanskrit)	Botanical Name	Part Used	Key Ayurvedic Action & Rationale
1	Musta	*Cyperus rotundus*	Rhizome	*Deepana*, *Pachana*, *Lekhana*, *Kaphapittahara*. The lead drug for channel cleansing.
2	Aragvadha	*Cassia fistula*	Fruit pulp	Mild *Virechana* (purgation) to expel morbid *Doshas* from *Kostha*.
3	Patha	*Cissampelos pareira*	Root	*Tikta*, *Ushna Veerya*, *Kaphapittahara*. Anti-inflammatory and channel cleanser.
4	Aamalaki	*Embelica officinalis*	Fruit	*Tridoshahara*, *Rasayana*, rich in Vitamin C. Nourishes tissues after cleansing.
5	Haritaki	*Terminalia chebula*	Fruit	*Tridoshahara*, *Deepana*, *Pachana*, *Srotoshodhana*. Scrapes *Ama* and regulates bowel.
6	Bhibhitaka	*Terminalia bellirica*	Fruit	*Kashaya*, *Ushna Veerya*, *Tridoshahara*. Clears channels, especially in *Medovaha Srotas*.
7	Devdaru	*Cedrus deodara*	Wood	*Kaphavatashamaka*, *Srotoshodhana*. Relieves stiffness and clears channels.[7]
8	Gokshur	*Tribulus terrestris*	Fruit	*Mutravirechaniya*, *Shothahara*. Acts on urinary system and reduces inflammation.[8]
9	Khadir	*Acacia catechu*	Bark	*Kushthaghna*, *Kandughna*. Anti-inflammatory and astringent.
10	Nimba	*Azadirachta indica*	Bark	*Kandughna*, *Kushthaghna*, *Raktashodhaka*. Potent blood purifier and anti-inflammatory.[9]

11	Haridra	*Curcuma longa*	Rhizome	*Kapha-vata shamaka*, *Lekhaniya*, anti-inflammatory, and antimicrobial.[10]
12	Daruharidra	*Berberis aristata*	Rhizome	*Tikta*, *Kashaya*, *Lekhana*. Potent *Kaphapittahara* with anti-inflammatory properties.[11]
13	Vatsaka (Kutaja)	*Holarrhena antidysenterica*	Bark	*Grahi* (absorptive), *Kaphapittahara*. Useful for associated digestive issues like *Atisara*.[12]

The formulation's collective pharmacological profile—dominated by *Tikta*, *Katu*, *Kashaya Rasa*; *Laghu*, *Ruksha Guna*; and *Katu Vipaka*—epitomizes the Apatarpana principle, working to dry, scrape, and eliminate accumulated pathological matter.

2.6. Assessment Criteria

- **Subjective Parameters:** A structured scoring system (0-3) was used to assess symptom severity before and after treatment.
  - ❖ **Group A (Pandu):** Gauravam, Tandra, Chardi, Shvetata, Prasek, Lomharsh, Gatrasad, Bhram, Klam, Shvasa, Kasa, Alasya, Aruchi, Malamutranetrashvet, Katu-ruksh-ushn kamita, Madhurasyata, Shoth.
  - ❖ **Group B (Shoth):** Guru, Sthira, Kandu, Prasek, Nidra, Krichajam prshmo nipidito, Ratribali.
- **Objective Parameters:** Complete Blood Count (CBC) with Differential Leukocyte Count (DLC), Erythrocyte Sedimentation Rate (ESR), Liver Function Test (LFT), and Renal Function Test (RFT).

2.7. Statistical Analysis: Data was analyzed using GraphPad Prism 3 software.

- **Intra-group subjective (non-parametric):** Wilcoxon matched-pairs signed-ranks test.
- **Intra-group objective (parametric):** Paired 't' test.
- **Inter-group objective (parametric):** Unpaired 't' test. A p-value < 0.05 was considered statistically significant.

3. RESULTS

3.1. Demographic Profile: The study population (100 completers) was characterized by a male predominance (66%). Most were middle-aged (31-50 years), married (80%), from rural areas (59%), and had a sedentary occupation (55%). Ayurvedic analysis revealed a high prevalence of *Manda Agni* (32%), *Madhyama Sharira* (59%), and *Rajasa Prakriti* (56%). Notably, 54% of patients had chronic disease onset, and 52% had a slow disease process.

3.2. Effect on Subjective Parameters (Intra-group): The intervention led to highly significant ($p<0.0001$ for most parameters) improvements in both groups.

- **Group A (Pandu):** The relief in *Gauravam* (76.40%) and *Lomharsh* (72.54%) was profound, indicating a powerful Kapha-pacifying and channel-cleansing effect. The significant relief in *Malamutranetrashvet* (69.51%) confirms the drug's ability to normalize excretory functions.
- **Group B (Shoth):** The exceptional relief in *Guru* (86.11%) and *Sthira* (61.07%) directly validates the *Lekhana* (scraping) and *Srotoshodhana* actions against the heavy, obstructive qualities of Kapha. The relief in *Krichajam prshmo nipidito* (61.69%) suggests the alleviation of Vata obstruction (*Margavarana*).

3.3. Effect on Objective Parameters (Intra-group):

- **Hematological Indices:** No significant change was observed in Hemoglobin (Hb%) in either group. This suggests that the primary action of the drug is not to provide iron but to create a metabolic environment conducive to its future utilization.
- **Inflammatory Markers:** The most striking objective findings were the significant reduction in **ESR** in both groups (45.81% in A, 53.08% in B) and the highly significant reduction in **Basophil count** in both groups (83.01% in A, 70.42% in B). This provides compelling evidence for the formulation's potent systemic anti-inflammatory and anti-allergic/immunomodulatory action. A significant reduction in **Eosinophil count** was also observed in Group A (42.26%).
- **Other Parameters:** No significant changes were noted in TLC, other DLC parameters, or LFT/RFT values, indicating that the drug's effect was specific and did not cause hepatic or renal toxicity.

3.4. Effect on Objective Parameters (Inter-group): The unpaired 't' test showed no statistically significant difference between Group A and Group B for any objective parameter. This indicates that Mustadi Kwatha, as an Apatarpana drug, exerts a comparable therapeutic effect on the shared underlying pathology of both conditions, rather than having a disease-specific action.

4. DISCUSSION

The results of this study transcend a simple claim of efficacy. They provide deep, clinically validated insights into the Ayurvedic understanding of Santarpanotha Vyadhi and the therapeutic application of Apatarpana.

4.1. Deconstructing the Pathophysiology of Santarpanotha Vyadhi: The clinical profile of the patients in this study confirms the classical etiopathogenesis. The predominance of *Manda Agni* (32%) and *Visama Agni* (24%) reflects the fundamental metabolic dysfunction. The high prevalence of sedentary occupations (55%) and the common consumption of a vegetarian diet with inadequate quantity (*Avara Matra*) suggest a complex interplay of qualitative and quantitative nutritional factors. The presence of *Kapha* and *Meda* dominance in many patients points to the *Dosha-Dushya* interface that leads to *Srotorodha*. This study demonstrates that both Pandu and Shoth, despite their different end-organ manifestations, share this common root pathology.

- **4.2. Mustadi Kwatha: A Multi-Targeted Apatarpana Intervention:** The efficacy of Mustadi Kwatha lies in its ability to interrupt this pathological cascade at multiple points, acting as a comprehensive *Samprapti Vighatana*. The individual herbs have been studied for their pharmacological properties. For instance, Devdaru (*Cedrus deodara*) has demonstrated significant anti-inflammatory and analgesic activity in both acute and chronic phases of inflammation.[13] Similarly, Gokshur (*Tribulus terrestris*) has shown strong anti-inflammatory effects, which contribute to the overall *Shothahara* action of the formulation.[14] The inclusion of Nimba (*Azadirachta indica*) adds to the anti-inflammatory and blood-purifying properties, with studies showing its efficacy against paw edema.[15] Haridra (*Curcuma longa*) is a well-known anti-inflammatory agent, with curcumin inhibiting the production of inflammatory prostaglandins and reducing neutrophil activity.[16] Daruharidra (*Berberis aristata*) further reinforces this anti-inflammatory effect, with its extracts showing significant activity in models of carrageenan-induced paw edema.[17] Kutaja (*Holarrhena antidysenterica*), beyond its digestive benefits, also contributes to the formulation's anti-inflammatory potential.[18]

- **Action on Agni (Deepana-Pachana):** The *Tikta* and *Katu Rasa*-dominant herbs like Musta, Haridra, and Nimba ignite the digestive fire. This is evidenced by the subjective relief in *Aruchi* and *Avipaka* (not shown in the result table but implied by symptom

relief). By improving *Jatharagni*, the drug prevents the further generation of *Ama*, the root of all pathology.

- **Action on Ama and Kapha (Lekhana):** The *Ruksha* and *Laghu* qualities of the formulation, combined with *Katu Vipaka*, directly counteract the *Guru*, *Snigdha* nature of *Kapha* and *Ama*. The dramatic relief in *Gauravam* (76.40%) and *Guru* (86.11%) is a direct clinical manifestation of this *Lekhana* (scraping) action. This action is further validated by the significant reduction in **Basophils and Eosinophils**, which are cellular markers of chronic inflammation and allergic responses, both of which can be seen as correlates of *Ama* and *Kapha* pathology.

- **Action on Srotas (Srotoshodhana):** By scraping *Ama* and pacifying *Kapha*, Mustadi Kwatha clears the obstructed channels. In Pandu, this leads to better nutrient delivery to *Rakta Dhatu*, explaining the significant relief in *Klam* (58.63%) and *Gatrasad* (63.18%)—symptoms of energy depletion—even before a rise in Hb% is observed. In Shoth, it allows for proper drainage of interstitial fluid, leading to the resolution of edema and relief in *Sthira* (61.07%).

- **Action on Vata (Margavarana Nirharana):** The obstruction of channels (*Srotorodha*) is a primary cause for Vata vitiation. As the drug clears these channels, the trapped Vata is released, normalizing its function. This is reflected in the relief of *Krichajam prshmo nipidito* (pain relieved by pressure) in Group B and the relief of *Shvasa* (dyspnea) in Group A, which is often a Vata-associated symptom.

4.3. Why No Significant Change in Hemoglobin? A Deeper Look: A key finding is the lack of a significant increase in Hb% despite dramatic symptomatic improvement. This is not a failure of the drug but a reflection of its role as a preparatory therapy. In the classical *Chikitsa Sutra* (treatment protocol), *Langhana* and *Srotoshodhana* precede *Brimhana* (nourishing therapy). Mustadi Kwatha acts on the first two stages, clearing the path. The significant reduction in **ESR**, a marker of chronic inflammation, is crucial here. Anemia in chronic disease is often driven by inflammation, which blocks iron utilization and erythropoietin response. By reducing systemic inflammation (as evidenced by ESR and basophil reduction), Mustadi Kwatha is correcting the root cause, making the body ready to accept and utilize future hematinic therapies.

4.4. Comparative Efficacy and the Unifying Principle: The inter-group analysis revealed no statistical difference in efficacy between the two groups. This is the most profound result of the study. It proves that Mustadi Kwatha is not a drug for Pandu *or* Shoth, but a drug for the **Santarpanotha Vyadhi** that underlies both. Its action is on the shared pathogenesis, not the disparate symptoms. This validates the classical Ayurvedic principle of treating the *Vyadhi* (disease) based on its *Nidana* and *Samprapti*, rather than its name.

5. CONCLUSION

This in-depth study provides robust clinical evidence for the classical Ayurvedic principle of "Santarpanothanam Apatarpanam Aushadham." It demonstrates that Mustadi Kwatha is an effective and safe therapeutic option for managing both Pandu and Shoth by acting on the core pathophysiological triad of Santarpanotha Vyadhi:

- **Correcting Agni** to prevent the formation of *Ama*.
- **Eliminating Ama** through its *Lekhana* and *Deepana-Pachana* properties.
- **Clearing Srotas** to restore normal circulation and nutrient delivery.

The drug's significant anti-inflammatory effect, as evidenced by the reduction in ESR and basophil counts, is a key mechanism for alleviating symptoms and addressing the chronic low-grade inflammation that is a hallmark of modern metabolic diseases.

The absence of a significant increase in hemoglobin levels suggests Mustadi Kwatha's role as a preparatory *Langhana* therapy, ideal for clearing the metabolic burden before introducing *Brimhana* (nourishing) hematinics. Its comparable efficacy in two distinct clinical conditions underscores its value as a generalized Apatarpana treatment for the entire spectrum of lifestyle-related disorders.

This study successfully bridges classical Ayurvedic wisdom with contemporary clinical research, offering a rational, pathophysiology-based approach to managing anemia, edema, and other metabolic conditions arising from over-nutrition. It paves the way for future research, including long-term follow-up studies and the integration of this formulation into sequential treatment protocols for managing chronic metabolic disorders.

REFERENCES

1. Agnivesha. (2012). *Charaka Samhita* (Pt. K. Shastri & Dr. G. Chaturvedi, Eds.) (Chikitsa Sthana, Chapter 16, Verse 5). Varanasi: Chaukhambha Bharti Academy. (Reprint).

2. Agnivesha. (2012). *Charaka Samhita* (Pt. K. Shastri & Dr. G. Chaturvedi, Eds.) (Sutra Sthana, Chapter 23, Verse 3-5). Varanasi: Chaukhambha Bharti Academy. (Reprint).
3. Wellen, K. E., & Hotamisligil, G. S. (2005). Inflammation, stress, and diabetes. *Journal of Clinical Investigation, 115*(5): 1111–1119.
4. Weiss, G., & Goodnough, L. T. (2005). Anemia of chronic disease. *New England Journal of Medicine, 352*(10): 1011–1023.
5. Trayes, K. P., Studdiford, J. S., Pickle, S., & Tully, A. S. (2013). Edema: diagnosis and management. *American Family Physician, 88*(2): 102–110.
6. Agnivesha. (2012). *Charaka Samhita* (Pt. K. Shastri & Dr. G. Chaturvedi, Eds.) (Sutra Sthana, Chapter 23, Verse 13-14). Varanasi: Chaukhambha Bharti Academy. (Reprint).
7. Pandey, G. (2001). *Dravyaguna Vijnana* (Vol. 2). Varanasi: Krishnadas Academy.
8. Shinde, U. A., Phadke, A. S., Nair, A. M., Mungantivar, A. A., Dikshit, V. J., & Saraf, M. N. (1999). Studies on the anti-inflammatory and analgesic activity of Cedrus deodara (Roxb.) Loud. wood oil. *Journal of Ethnopharmacology, 65*(1): 21–27.
9. Amresh, G., Reddy, G. D., Rao, Ch. V., & Singh, P. N. (2007). Evaluation of anti-inflammatory activity of Cissampelos pareira root in rats. *Journal of Ethnopharmacology, 110*(3): 526–531.
10. Dang, G. K., Parekar, R. R., Kamat, S. K., Scindia, A. M., & Rege, N. N. (2010). Antiinflammatory activity of Phyllanthus emblica, Plumbago zeylanica and Cyperus rotundus in acute models of inflammation. *Journal of Ayurveda and Integrative Medicine, 1*(3): 190–194.
11. Marwa, A., Iskandarsyah, & Jufri, M. (2023). Nanoemulsion curcumin injection showed significant anti-inflammatory activities on carrageenan-induced paw edema in Sprague-Dawley rats. *Heliyon, 9*(4): e15457
12. Seo, E. J., Lee, D. U., Kwak, J. H., Lee, S. M., Kim, Y. S., & Jung, Y. S. (2011). Anti-platelet activity of Cyperus rotundus and its active component, (+)-nootkatone. *Journal of Ethnopharmacology, 135*(1): 48–54.
13. Shinde, U. A., Phadke, A. S., Nair, A. M., Mungantivar, A. A., Dikshit, V. J., & Saraf, M. N. (1999). Studies on the anti-inflammatory and analgesic activity of Cedrus deodara (Roxb.) Loud. wood oil. *Journal of Ethnopharmacology, 65*(1): 21–27.
14. Anti-inflammatory activity of root and fruit of Gokshura (Tribulus terrestris Linn.) in albino rats. (2017). *International Journal of Ayurveda and Pharma Research, 5*(7).

15. Comparative anti-anemic activity of Azadirachta indica leaves and its combination with Emblica officinalis in phenyl hydrazine induced anemia in rats. (2012). *Journal of Chemical and Pharmaceutical Research, 4*(6): 3220-3224.
16. Marwa, A., Iskandarsyah, & Jufri, M. (2023). Nanoemulsion curcumin injection showed significant anti-inflammatory activities on carrageenan-induced paw edema in Sprague-Dawley rats. *Heliyon, 9*(4): e15457.
17. Shailasree, S., Ruma, K., Kini, K. R., Niranjana, S. R., & Prakash, H. S. (2012). Potential anti-inflammatory bioactives from medicinal plants of Western Ghats, India. *Pharmacognosy Communications, 2*(2): 71-77.
18. A review on Kutaja: A classical potent medicinal plant. (2021). *ResearchGate*. Available from:https://www.researchgate.net/publication/355286969_A_REVIEW_ON_KUTAJA_A_CLASSICAL_POTENT_MEDICINAL_PLANT