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Bridging Classical Ayurvedic Knowledge and Modern Medicine: A Scientific Investigation of Ashtatrika and Its Clinical Relevance

[1]Dr.Sakshi Aniket Pratapwar, [2]Dr. M. R Sajjanshetty, [3]Dr. Aniket Pramod Pratapwar

[1]3rd yr pg scholar, Department of Samhita and Siddhanta, SVM Ayurvedic Medical College Ilkal 587125,Bagalkot, Karnataka, India, sakshikomawar@gmail.Com

[2]Professor and HOD, Department of Samhita and Siddhanta, SVM Ayurvedic Medical College Ilkal 587125, Bagalkot, Karnataka, India

[3]Professor And HOD, Department of Roga Nidan Evam Vikriti Vigyan, Smt. Sumitrabai Thakare Ayurvedic College, Yavatmal

Corresponding Author: Dr. Sakshi Aniket Pratapwar, sakshikomawar@gmail.com

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Abstract

Ashtatrika denotes eight triadic groupings in two contexts of the Caraka Saṃhitā. Their categorical organization offers a basis for investigating continuity and variation in classical Ayurvedic reasoning. To compare the two classical eight-triad enumerations, quantify their categorical correspondence, and identify candidate domains for prospective clinical measurement. A comparative content analysis was conducted using Sūtrasthāna 11 and Cikitsāsthāna 24. Sixteen top-level headings were extracted, classified into five analytical domains, and compared using strict lexical and synonym-normalized Jaccard indices. Explicit subtype specification was recorded. Two Aṣṭavarga-associated plant species were documented separately as botanical terminology comparators. Each context contained eight headings. Bala was the single shared lexical label (Jaccard index, 1/15 = 0.067); treating roga and vyādhi as equivalent disease labels yielded two shared categories (2/14 = 0.143). Sūtrasthāna included two practice-related, one host-related, three disease-related, and two care-related headings. Cikitsāsthāna included two practice-related, four host-related, one disease-related, and one temporal heading. All eight Sūtrasthāna headings had three explicitly named members in the selected chapter passages; the Cikitsāsthāna enumeration named the headings without detailing all their members in the two enumeration verses. The two Ashtatrika frameworks share an eight-triad organizational pattern while differing in topical emphasis. The reproducible coding matrix, correspondence measures, and clinical measurement crosswalk establish a foundation for prospective investigation of individualized Ayurvedic assessment.

1. INTRODUCTION

The Caraka Saṃhitā presents the philosophical and clinical information in a tripartite classification, which is concise. Sūtrasthāna 11 lists eight headings of triads related to pursuits, pillars of life, strength, causes and types of disease, pathways of manifestation, categories of practitioners, and therapeutic approaches [1]. Another grouping of eight triads is described in Cikitsāsthāna 24 in its discussion of madātyaya, namely anna, pāna, vayas, vyādhi, bala, kāla, doṣa, and sattva [2]. The two contexts offer different uses of a classificatory structure.

Previous scholarship has pointed out that there are two enumerations in the larger numerical scheme of the Caraka Saṃhitā [3]. They are precisely lexically matched, distributed across clinical domains, and to a greater extent, localized in the clinical subtype, and thus may be directly compared. These features were studied with the two enumerations as a fixed primary text data set.

Aṣṭavarga is a unique Ayurvedic combination of eight medicinal plants [4]. The botanical terminology is useful as a comparison with Ashtatrika, which refers to triadic concepts in the passages studied here [1,2]. For example, the accepted names and taxonomic rank of two Aṣṭavarga-associated taxa were verified against Plants of the World Online (POWO): Polygonatum verticillatum (L.) All. and Lilium polyphyllum D.Don [5,6].

Polygonatum verticillatum belongs to the family Asparagaceae and Lilium polyphyllum to Liliaceae [5,6]. The traditional medicinal-name associations of these plants are recorded in Kew's Medicinal Plant Names Services, respectively as mahameda and kakoli [7,8]. Taxonomic rank with schematic illustrations of the plants is given in Tables 1A–B. This comparative nomenclatural material is different from the text units for the primary analysis.

Table 1A. Taxonomic classification of *Polygonatum verticillatum* (L.) All. [5,7]

Kingdom:	Plantae
Phylum:	Streptophyta
Class:	Equisetopsida
Subclass:	Magnoliidae
Order:	Asparagales
Family:	Asparagaceae
Genus:	*Polygonatum*
Species:	*Polygonatum verticillatum (L.) All.*



Illustrative botanical habit: whorled leaves, pendent flowers

Taxonomy: Plants of the World Online, Royal Botanic Gardens, Kew [5]. Botanical drawing: schematic illustration.

Table 1A. Taxonomic classification of Lilium polyphyllum D.Don [6,8]

Kingdom:	Plantae
Phylum:	Streptophyta
Class:	Equisetopsida
Subclass:	Magnoliidae
Order:	Liliales
Family:	Liliaceae
Genus:	*Lilium*
Species:	*Lilium polyphyllum D.Don*



Illustrative botanical habit: leafy stem, recurved lilies

Taxonomy: Plants of the World Online, Royal Botanic Gardens, Kew [6].

The madātyaya passage correlates the consumption of food and drinks with age, disease, strength, time, doṣa and sattva [2]. This setup implies different domains of exposure, host and context that can be explored in current clinical studies. These headings can be extracted easily and compared in terms of their organization using structured content analysis (10,11).

The main goal was to quantify the correspondence between the two sets of eight headings, both with respect to the strict sense of the term and after conservative synonym normalization. Secondary goals included comparing their five domains' distributions, explicit subtype specification and candidate measures for future observational studies. Original contribution: source-anchored extraction matrix, replicable categorical coding process, and quantitative comparison of the two classical contexts.

2. MATERIAL AND METHODS

2.1. Study design and unit of analysis

A comparative, summative primary-text content analysis was undertaken. The sampling frame was the Ashtatrika recapitulatory enumeration in Sūtrasthāna 11 and the eight-triad enumeration in Cikitsāsthāna 24. One analytical unit was used for each top level heading, resulting in sixteen category instances (eight for each context). Subordinate members were entered as descriptors. The extraction and coding was conducted according to the principles of content analysis [10–13].

2.2. Textual passages and inclusion criteria

Sūtrasthāna 11.3, 11.34–55, and 11.64–65 supplied the eight headings and their explanatory context [1]. Cikitsāsthāna 24.68–69 supplied the second enumeration; verses 70–79 informed the local interpretation [2]. Eligibility was restricted to distinct top-level headings within these enumerations. Repeated mentions and subordinate triplets were treated as contextual information. Verse references and terminology were checked against accessible edited Sanskrit presentations.

2.3. Ancillary botanical nomenclature procedure

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Botanical comparison recorded accepted taxonomic names and eight rank classification of P. verticillatum and L. polyphyllum using POWO [5,6]. Each classification table was accompanied by a schematic botanical drawing. The taxa were not part of the sixteen-unit analytical sample, but were included in a separate nomenclatural comparison. Molecular authentication techniques such as ITS2 barcoding [9] can be used to support specimen documentation for investigations involving collected medicinal-plant material.

2.4. Content coding and reproducibility

A structured record was created for each triad, including passage, canonical label, locally named members, and analytical domain. The five mutually exclusive domains were practices/priorities (eṣaṇā, upastambha, anna, pāna), host attributes (bala, vayas, doṣa, sattva), disease/exposure (āyatana, roga, rogamārga, vyādhi), care response (bhiṣaj, auṣadha), and time/context (kāla). Both enumerations were coded using the same domain definitions, which are listed in Table 2.

If the three constituent members of the subtype were found in the selected passage, then the passage was coded as explicit for the subtype. In the case of Cikitsāsthāna, subtype resolution was evaluated only in verses 68-69. Only one coding pass was completed and the extraction matrix was kept for independent replications. A subsequent multi-annotator assessment can be done using established reliability procedures [14].

2.5. Similarity indices and descriptive analysis

Canonical labels were obtained by removing numerical and grammatical markers while preserving distinct lexical roots. Strict correspondence was calculated with the Jaccard index, $J = |A \cap B| / |A \cup B|$ [15]. A sensitivity comparison additionally normalized roga and vyādhi as the same disease heading. All other labels retained their canonical distinctions.

Category counts, set intersections, unions, and similarity ratios were recomputed in Python 3.13.5 and checked against the sixteen extracted records. Analysis was descriptive because the dataset comprised the complete set of headings in the two selected enumerations. Frequencies and Jaccard indices were therefore reported without inferential hypothesis tests.

2.6. Ethical considerations

The study analyzed published classical texts and public taxonomic records. Institutional ethical review and informed consent were not applicable to this source-based design.

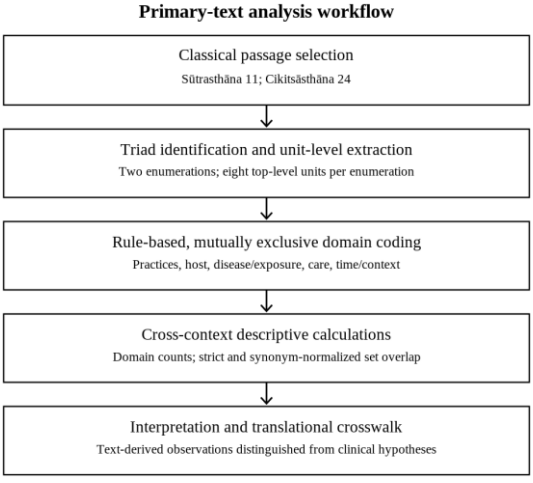


Figure 1. Primary-text research workflow: passage selection, sixteen-unit extraction, domain coding, lexical and synonym-normalized similarity analysis, descriptive results, and prospective clinical measurement mapping.

3. RESULTS

3.1. Extracted triad categories

There were 16 top-level category instances in each enumeration, and 8 different headings in each context. Sūtrasthāna spoke on pursuits, factors related to living, strength, causes and classification of disease, disease paths, types of practitioners and therapeutic methods. Cikitsāsthāna stressed upon the factors of intake, age, disease status, strength, timing, doṣa and sattva. The full extraction and domain assignments are given in Table 2.

Table 2. Complete sixteen-unit primary-text extraction and analytical domain matrix [1,2].

ID	Passage	Topic	Three members / local status	Domain
S1	Su 11.3, 64–65	eṣaṇā	prāṇaiṣaṇā; dhanaiṣaṇā; paralokaiṣaṇā	Practices
S2	Su 11.35	upastambha	āhāra; svapna; brahmacarya	Practices
S3	Su 11.36	bala	sahaja; kālaja; yuktikṛta	Host
S4	Su 11.37–43	āyatana	asātmyendriyārtha-saṃyoga; prajñāparādha; pariṇāma	Disease/exposure
S5	Su 11.45	roga	nija; āgantu; mānasa	Disease/exposure
S6	Su 11.48	rogamārga	śākhā; marmāsthi-sandhi; koṣṭha	Disease/exposure
S7	Su 11.50–53	bhiṣaj	bhiṣak-chadmacara; siddha-sādhita; vaidya-guṇa-yukta	Care response

ID	Passage	Topic	Three members / local status	Domain
S8	Su 11.54	auṣadha	daivavyapāśraya; yuktivyapāśraya; sattvāvajaya	Care response
C1	Ci 24.68–69	anna	Triad identified; members implicit	Practices
C2	Ci 24.68–69	pāna	Triad identified; members implicit	Practices
C3	Ci 24.68–69	vayas	Triad identified; members implicit	Host
C4	Ci 24.68–69	vyādhi	Triad identified; members implicit	Disease/exposure
C5	Ci 24.68–69	bala	Triad identified; members implicit	Host
C6	Ci 24.68–69	kāla	Triad identified; members implicit	Time/context
C7	Ci 24.68–69	doṣa	Tridoṣa identified; members implicit	Host
C8	Ci 24.68–69	sattva	Threefold sattva identified; members implicit	Host

Su, Sūtrasthāna; Ci, Cikitsāsthāna. The Cikitsāsthāna enumeration identifies eight triadic headings; their individual subtype members are not itemized within verses 24.68–69.

3.2. Domain distribution

There were differences in the distribution of the two contexts within the five coding domains (Table 3; Figure 2). Sūtrasthāna contained two headings for practices/priorities, one heading for host, three headings for disease/exposure and two headings for care-response. The two practices/intake headings, four host headings, one disease heading and one temporal heading were included in Cikitsāsthāna. The domain frequencies have been aggregated into eight frequencies per context.

Table 3. Observed domain frequencies in the two eight-triad enumerations.

Prespecified coding domain	Sūtrasthāna 11 (n)	Cikitsāsthāna 24 (n)
Practices / priorities	2	2
Host attributes	1	4
Disease / exposure	3	1
Care response	2	0
Time / context	0	1
TOTAL	8	8

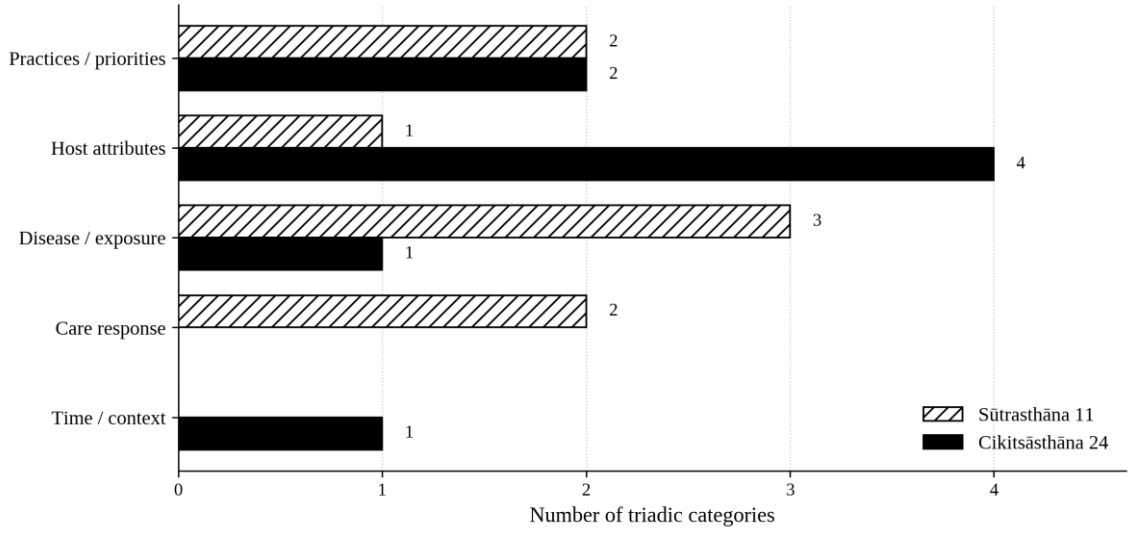


Figure 2. Observed frequencies across five analytical domains. Hatched bars represent Sūtrasthāna 11; solid black bars represent Cikitsāsthāna 24. Each context contributes eight category headings.

3.3. Cross-context lexical and synonym-normalized correspondence

If lexical normalization is applied strictly, only one common label, bala, was found, and this was common to 15 different labels (J = 1/15 = 0.0667; rounded to 0.067). For the synonym-normalized comparison, the terms roga and vyādhi were considered as synonymous disease terms. The remaining two categories were then bala and disease, giving J = 2/14 = 0.1429 (approx. 0.143). The difference in the coefficients was 0.0762, which was due to this one normalization rule.

3.4. Explicit subtype specification

All eight Sūtrasthāna headings had three identifiable members within the selected chapter passages. Cikitsāsthāna 24.68–69 identifies six triadic topics and additionally names tridoṣa and threefold sattva. The latter enumeration specifies the eight headings while leaving individual constituent members to their wider textual context.

3.5. Candidate clinical measurement domains

A preliminary measurement crosswalk was created by mapping the headings of the Cikitsāsthāna with the possible observation types (Table 4). There are direct observational counterparts for food intake, beverage exposure, age, diagnosed disease, and time. The classical constructs of strength, doṣa and sattva were kept for future instrument development and validation.

Table 4. Candidate observational measures derived from the Cikitsāsthāna headings.

Classical heading	Candidate research observation	Measurement status
anna	Recent food consumption, meal time, dietary recall	Directly observable
pāna	Drink type, ethanol quantity, drinking pattern	Directly observable
vayas	Chronological age	Recorded covariate
vyādhi	Diagnosed conditions, presenting symptoms	Clinical criteria required
bala	Functional reserve, performance or frailty measures	Candidate comparator for validation
kāla	Time of intake, symptom onset, season, follow-up	Recorded context
doṣa	Separately specified classical phenotyping instrument	Instrument development and validation
sattva	Separately specified psychological/behavioral instrument	Instrument development and validation

3.6. Integrative interpretation and research hypothesis

The Cikitsāsthāna classification allocated a greater proportion of its headings to host attributes and intake-related contexts. The juxtaposition of anna and pāna suggests a prospective research question: whether meal timing is associated with measured ethanol exposure at a given intake, after accounting for age and coexisting disease. This hypothesis follows from the category structure and is intended for subsequent observational investigation.

4. DISCUSSION

The two passages are both in eight-triad form, but have very different topics. Sūtrasthāna is more on general disease-and-care reasoning, while Cikitsāsthāna is more focused on exposure circumstances and individual characteristics. The present study extends this description by providing unit-level coding, domain frequencies and a quantified lexical sensitivity comparison.

The taxonomic comparison helps to understand the different subjects of Ashtatrika and Aṣṭavarga. The botanical names of Polygonatum verticillatum and Lilium polyphyllum have been accepted and the clinical and philosophical concepts in the Ashtatrika passages analyzed here are organized. This distinction helps to ensure accurate usage of terms in text and botanical studies.

All of these clinical recording methods have been established for age and diagnosed comorbidity, whereas for bala, doṣa, and sattva, construct-specific operational definitions are needed. The associations of biological and phenotypic characteristics with the Ayurvedic constitutional categories have been studied [16,17]; this research sets a precedent for independently measuring traditional classifications and contemporary health variables. A prospective evaluation could test the reliability and incremental informativeness of these measures.

The combination of the characters anna and pāna has a plausible biomedical context. The effects of meal composition and fed or fasted state on ethanol concentration profiles and pharmacokinetic parameters have been reported in human studies [18,19]. Alcohol dehydrogenase, aldehyde dehydrogenase, CYP2E1 and related pathways are involved in ethanol metabolism [20,21]. The classical enumeration is a motivating observation for the prospective evaluation of diet, drinking exposure and host factors.

The present results are related to textual structure and categorical correspondence. Next, they would apply them in an observational study that was designed separately for measures of exposure, patient characteristics, and clinical outcomes.

The analysis is equipped with a complete and traceable set of predefined text units, uniform domain assignments and unambiguous label-normalization rules. It is only applicable to two edited passage contexts and a single coding pass. The independent replications are still at the manuscript level and with inter-rater reliability. Similarity values reported are measures of categorical correspondence in this data set.

5. CLINICAL RELEVANCE

The clinical relevance is the ability to convert the Cikitsāsthāna headings into a structured testable assessment framework. Anna and pāna recommend time anchored documentation of dietary and alcohol exposure. In the future, validated tools like the Alcohol Use Disorders Identification Test (AUDIT) and its subset Alcohol Use Disorders Identification Test (AUDIT-C) may be used in conjunction with the classical variables [22,23].

Functional performance and frailty instruments are potential comparator measures for bala [24]. Doṣa and sattva may be measured by separate instruments and assessed for reliability and construct validity based on the measurement property criteria [25]. A prospective clinical cohort may investigate these measures in conjunction with the usual health covariables and publish its results in accordance with the guidelines for observational studies relevant to these measures, such as STROBE [26].

6. SAFETY AND TRANSLATIONAL CONSIDERATIONS

Clinical assessment of alcohol-related harm should be based on known evidence of alcohol exposure and age and consumption level variation in harm [27,28]. Alcohol is a psychoactive, dependence-producing substance that can cause a high level of health burden, according to the World Health Organization [29]. These are some of the factors to consider in developing an ethically sound observational investigation in the madātyaya context.

Botanical authentication, formulation characterization and safety assessment would be conducted at the level of the specified intervention in any future study of a particular Ayurvedic medicinal product. The present botanical comparison gives the accepted nomenclature for two taxa associated with Aṣṭavarga and the main findings are related to Ashtatrika as a classification system.

7. CONCLUSION

There are two enumerations of the Ashtatrika, each with eight headings, and one common canonical label (bala) and two common labels following conservative disease-term normalization. They have five domains distributed in different ways in the general doctrinal and intoxication-related context. This yields an extraction matrix and a list of candidate measurement crosswalks that can be used for future evaluation of clinically observable Ayurvedic categories in a reproducible manner. A later study might compare variant readings of Sanskrit in different editions and assess the codebook using independent annotators. A preregistered observational cohort could then assess the reliability of classical constructs and the added value of intake, host, and temporal information for clinical characterization. Detailed studies of defined medicinal-plant interventions would need to be done using different methods of authentication and pharmacognostic.

List of Abbreviations

AUDIT, Alcohol Use Disorders Identification Test; AUDIT-C, Alcohol Use Disorders Identification Test–Consumption; Ci, Cikitsāsthāna; CYP2E1, cytochrome P450 2E1; ITS2, internal transcribed spacer 2; POWO, Plants of the World Online; Su, Sūtrasthāna; STROBE, Strengthening the Reporting of Observational Studies in Epidemiology.

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