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PURUSH VANDHYATVA (MALE INFERTILITY): A CRITICAL INTEGRATIVE REVIEW OF AYURVEDIC CONCEPTUAL FRAMEWORKS AND CONTEMPORARY BIOMEDICAL EVIDENCE

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ABSTRACT

Background: Male infertility, recognised in classical Ayurvedic texts as Purush Vandhyatva, constitutes a global reproductive health burden contributing to approximately 20–50% of infertility cases worldwide. Despite remarkable advances in andrology and assisted reproductive technologies (ART), aetiological complexity continues to challenge clinicians. Ayurvedic scholars systematically catalogued semen disorders, pathogenic mechanisms, and therapeutic principles millennia before the advent of modern spermatology, creating a parallel conceptual architecture that warrants rigorous academic re-examination.

Objective: This article critically reviews the Ayurvedic conceptualisation of Purush Vandhyatva in the Charaka Samhita and Sushruta Samhita alongside contemporary biomedical evidence, exploring congruences, divergences, and areas of untapped research potential.

Methods: A systematic narrative review was conducted using classical Ayurvedic primary texts (Charaka Samhita, Sushruta Samhita, Ashtanga Hridayam) and peer-reviewed biomedical literature published between 2013 and 2024, sourced from PubMed, Scopus, and Google Scholar using MeSH-aligned search terms related to male infertility, semen parameters, oxidative stress, and Ayurvedic andrological concepts.

Results: Classical Ayurvedic texts describe eight types of Shukra Dushti (semen abnormalities), a multifactorial aetiological framework encompassing nutritional, lifestyle, psychosexual, traumatic, and hereditary causes, and a Dosha-based pathogenesis model (Samprapti) that corresponds structurally to modern semen parameter categories including oligospermia, asthenospermia, and azoospermia. Hereditary disorders described as Pitruja Sahaj Vikarani demonstrate conceptual alignment with Y-linked genetic disorders.

Conclusion: Purush Vandhyatva represents a holistically conceived clinical entity in Ayurveda that overlaps substantially with contemporary andrological classifications. Validated integrative research protocols are urgently needed to translate classical therapeutic principles into evidence-based clinical applications. The study identifies significant research gaps including the absence of randomised controlled trials on classical Vajikarana formulations for specific semen parameter deficits.

KEYWORDS: Purush Vandhyatva; male infertility; Shukra Dushti; Vajikarana; semen parameters; Dosha; Ayurvedic andrology; integrative reproductive medicine

1. INTRODUCTION

Infertility is defined by the World Health Organization (WHO) as the failure of a couple to achieve clinical pregnancy after 12 months or more of regular, unprotected sexual intercourse.[1] It is estimated to affect approximately 186 million individuals globally, with male factor infertility exclusively or contributorily responsible in up to 50% of cases.[2] Within this epidemiological landscape, male factor infertility alone accounts for approximately 20–30% of all infertile couples, making it a significant public health concern.[3]

The biomedical approach to male infertility has evolved considerably since the pioneering spermatological work of Antonie van Leeuwenhoek in the seventeenth century. Contemporary andrology encompasses advanced semen analysis, hormonal profiling, genetic karyotyping, testicular biopsy, and ART modalities including intracytoplasmic sperm injection (ICSI) and in vitro fertilisation (IVF).[4] Despite these advances, idiopathic male infertility — where no

demonstrable cause can be identified — constitutes 30–40% of male infertility cases, underscoring the limits of current aetiological understanding.[5]

Ayurveda, the classical Indian system of medicine, documented a comprehensive framework for male reproductive dysfunction centuries before the emergence of modern spermatology. The Charaka Samhita (Chikitsa Sthana, Chapter 30) and Sushruta Samhita (Sharira Sthana, Chapter 2) delineate the concept of Purush Vandhyatva — literally, male infertility — through an elaborate taxonomy of semen disorders (Shukra Dushti), multifactorial causal classification (Nidana), Dosha-based pathogenesis (Samprapti), and therapeutic interventions under the rubric of Vajikarana Tantra (aphrodisiac and virility-enhancing therapy).[6]

Critically, the Ayurvedic framework anticipates several constructs now recognised in modern andrology: the role of oxidative stress, the impact of dietary and lifestyle factors on spermatogenesis, psychogenic erectile dysfunction, and the genetic basis of hereditary infertility. However, systematic academic comparisons bridging these two knowledge systems remain sparse, and the translation of classical therapeutic knowledge into validated evidence-based protocols is nascent.

This review aims to critically analyse the Ayurvedic conceptualisation of Purush Vandhyatva in light of contemporary biomedical evidence, identify structural congruences and divergences, highlight existing research gaps, and propose a framework for future integrative investigations.

2. LITERATURE REVIEW

2.1 Classical Ayurvedic Scholarship on Male Reproductive Health

The Charaka Samhita, compiled approximately between the 1st century BCE and 2nd century CE, devotes substantial attention to male reproductive physiology and pathology within the Vajikarana Tantra, one of the eight branches (Ashtanga Ayurveda) of the classical medical system.[7] Acharya Charaka characterises Shukra (reproductive essence/semen) as the culmination of the Sapta Dhatu (seven body tissues) and the substrate of procreation. Eight distinct forms of Shukra Dushti are enumerated in Charaka Samhita Chikitsa Sthana 30/139: Fenilam (foamy semen), Tanu (thin), Ruksha (dry), Vivarna (discoloured), Puti (putrid), Picchilam (slimy), Anya Dhatu Upasansrushta (contaminated with other tissues), and Avasadi (sedimenting semen).[8]

Sushruta Samhita Sharira Sthana 2/3 describes semen vitiated by morbid Doshas and characterised by foul smell, granulation, decreased volume, or contamination with urine and stool odour as incapable of producing progeny.[9] These descriptions prefigure modern macroscopic and microscopic semen analysis criteria established by the WHO Laboratory Manual for Human Semen Analysis.

More sophisticated is the anatomical-physiological classification in Sushruta Samhita Sharira Sthana 2/33, which delineates four prerequisites for conception: Ritu (fertile period), Kshetra (receptive uterine field/male reproductive tract), Ambu (nutritional support), and Bija (viable seed/gamete). Abnormalities in any of these domains may cause infertility, a multidimensional framework that parallels the contemporary biomedical categorisation of pre-testicular, testicular, and post-testicular causes of male infertility. [10]

2.2 Modern Epidemiology and Biomedical Classification

Globally, the prevalence of male infertility has been variably reported. Agarwal et al. (2015) estimated that male infertility affects approximately 7% of all men. [2] Krausz and Riera-Escamilla (2018) in a landmark review published in Nature Reviews Urology highlighted the substantial contribution of genetic factors, estimating that chromosomal abnormalities, including Klinefelter syndrome (47XXY), are detected in approximately 10–15% of azoospermic men. [3]

The contemporary biomedical classification of male infertility broadly encompasses: (i) pre-testicular causes including hypogonadotrophic hypogonadism, hyperprolactinaemia, and thyroid dysfunction; (ii) testicular causes encompassing varicocele, cryptorchidism, orchitis, and genetic disorders such as Y-chromosome microdeletions; and (iii) post-testicular causes including obstructive azoospermia, ejaculatory dysfunction, and epididymal disorders.[11] Oxidative stress, now recognised as a central mechanism in male infertility, is implicated in up to 80% of infertile men, causing DNA fragmentation, lipid peroxidation of sperm membranes, and impaired mitochondrial function.[12]

2.3 Comparative Thematic Analysis: Congruences Between Systems

Several thematic parallels between Ayurvedic and biomedical frameworks are identifiable. First, the Ayurvedic Nidana (aetiological) classification in Charaka Samhita Chikitsa Sthana 30/135–137 categorises causes under nutritional (Ahara), lifestyle (Vihara), psychosexual, traumatic, and systemic disease-related domains. [8] This mirrors the biomedical classification remarkably, given that modern andrology similarly identifies nutritional status, sedentary behaviour, sexual dysfunction, genital trauma, and systemic illness as significant contributors to male infertility. [13]

Second, the Vata Dushta Shukra description — foamy, thin, dry, ejaculated in small quantity with difficulty — corresponds closely to oligospermia with reduced ejaculatory volume and asthenospermia. Kapha Dushta Shukra (excessively slimy semen) may reflect increased leukocyte concentration or seminal hyperviscosity, conditions associated with genital tract infection. [14] Pitta Dushta Shukra (yellowish-blue, warm, malodorous semen) parallels the clinical presentation of pyospermia or haematospermia. [15]

Third, hereditary reproductive disorders delineated in Ayurvedic texts — particularly Sahaj Klaibya (hereditary impotency/infertility) attributed to Pitruja Sahaj Vikarani (paternal hereditary disorders) — demonstrate conceptual alignment with Y-linked genetic transmission of infertility, including AZF (Azoospermia Factor) locus microdeletions on the Y chromosome, which are the commonest genetic cause of severe oligospermia and non-obstructive azoospermia in contemporary andrology. [16]

2.4 Gaps in Existing Literature

Notwithstanding these convergences, critical gaps persist. The existing literature on Ayurvedic andrological concepts is predominantly descriptive and textual-exegetical rather than experimental. Clinical trials evaluating Vajikarana formulations — such as Ashwagandha (Withania somnifera), Shatavari (Asparagus racemosus), and Kapikacchu (Mucuna pruriens) — have been conducted in small, heterogeneous samples without standardised semen parameter outcome reporting conforming to WHO 2010 or 2021 guidelines.[17,18] Additionally, the mechanistic pathways through which Dosha vitiation affects spermatogenesis at the molecular level remain uninvestigated. The concept of Shukra Dhatu as the culminating tissue essence has not been mapped to any specific biomarker, limiting cross-system translation.

3. MATERIALS AND METHODS

3.1 Study Design

This study employs a systematic narrative review design, integrating classical Ayurvedic textual analysis with a structured review of contemporary peer-reviewed biomedical literature. The methodology follows the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) extension for narrative reviews and the SANRA (Scale for the Assessment of Narrative Review Articles) quality assessment framework. [19]

3.2 Primary Textual Sources

Classical Ayurvedic sources examined included:

- Charaka Samhita of Acharya Charaka and Agnivesha, Chikitsa Sthana Chapter 30 (Vajikarana Adhyaya), referenced from Chaukhamba Sanskrit Pratishthan, New Delhi, 2019 edition.
- Sushruta Samhita of Acharya Sushruta, Sharira Sthana Chapters 2 and 4, referenced from Krishnadas Academy, Varanasi.
- Ashtanga Sangraha of Acharya Vagbhata, Sutra Sthana 22/3, referenced from Shree Baidynath Ayurved Bhavan Ltd, Nagpur, 1981 (Hindi translation, 2nd edition).

3.3 Biomedical Literature Search Strategy

A structured electronic database search was conducted across PubMed/MEDLINE, Scopus, Cochrane Library, and Google Scholar. The search was restricted to publications between January 2013 and December 2024 to ensure contemporary relevance. Search terms employed included: "male infertility", "Purush Vandhyatva", "Ayurvedic andrology", "semen parameters", "oligospermia", "azoospermia", "asthenospermia", "oxidative stress spermatogenesis", "Y chromosome microdeletion", "Klinefelter syndrome", "Vajikarana", "Withania somnifera male fertility", "Mucuna pruriens spermatogenesis", and "varicocele male infertility".

3.4 Inclusion and Exclusion Criteria

Inclusion Criteria

- Peer-reviewed original research articles, systematic reviews, and meta-analyses published in indexed journals (Scopus, PubMed, Web of Science).
- Studies reporting semen parameter outcomes conforming to WHO 2010 or 2021 reference values.
- Classical Ayurvedic texts with established scholarly commentary and translation.
- Studies on herbal interventions for male infertility with standardised botanical identification.
- Articles published in English or with validated English translations.

Exclusion Criteria

- Conference abstracts, editorials, and non-peer-reviewed commentaries.
- Studies with sample sizes below 30 participants or lacking control groups for clinical trials.
- Animal studies without human clinical correlation.
- Studies without clearly defined diagnostic criteria for male infertility.
- Duplicate publications and grey literature.

3.5 Data Extraction and Synthesis

Data extraction was performed independently by both authors using a standardised pro forma capturing: study design, sample characteristics, interventions or textual descriptions, outcome measures, and key findings. Thematic synthesis followed a framework approach, organising findings under five domains: taxonomy of semen disorders, aetiological classification, pathogenesis, hereditary factors, and therapeutic implications. Discrepancies in data extraction were resolved through consensus discussion.

3.6 Quality Assessment

Biomedical studies were assessed using the Newcastle-Ottawa Scale (NOS) for observational studies and the Jadad scale for randomised controlled trials. Ayurvedic textual sources were evaluated for scholarly authenticity using criteria of textual lineage, commentary tradition (Tika), and consistency across manuscript traditions. Only sources with established critical editions were included.

4. RESULTS

4.1 Literature Search Yield

The initial electronic database search yielded 847 records. Following de-duplication, 687 unique records were screened. After title and abstract screening, 214 full-text articles were assessed for eligibility. A total of 68 biomedical studies and 6 classical Ayurvedic primary source references met the inclusion criteria and were included in the final synthesis. Classical textual sources contributed an additional 24 primary verse references (shlokas) directly relevant to Purush Vandhyatva.

4.2 Taxonomy of Shukra Dushti: An Ayurvedic Semen Classification

The eight-fold classification of semen abnormalities described in Charaka Samhita Chikitsa Sthana 30/139 represents the earliest documented systematic taxonomy of semen pathology in any medical tradition. Table 1 presents a comparative mapping of these classical categories to contemporary semen analysis parameters.

Table 1: Comparative Mapping of Shukra Dushti to Modern Semen Analysis Parameters

Ayurvedic Type	Sanskrit Description	Clinical Correlation (Modern)	Probable Mechanism
Fenilam	Foamy semen	Hyperviscosity; excess seminal fructose	Vata vitiation; increased seminal plasma protein
Tanu	Thin/watery semen	Oligospermia; reduced seminal viscosity	Vata; reduced Shukra Dhatu synthesis
Ruksha	Dry semen	Hypospermia (<1.5 ml); reduced ejaculatory volume	Vata; dehydration; obstruction
Vivarna	Discoloured semen	Haematospermia; pyospermia	Pitta/Rakta Dushti; infection
Puti	Putrid/malodorous semen	Genital tract infection; leukocytospermia	Pitta; bacterial infection
Picchilam	Excessively slimy semen	Seminal hyperviscosity; mucus contamination	Kapha Dushti
Anya Dhatu Upasansrushta	Mixed with other secretions	Retrograde ejaculation; haematospermia; urinary contamination	Anatomical defects; trauma
Avasadi	Sedimenting semen	Teratospermia; necrospermia; sperm clumping	Vata obstruction; ejaculatory suppression

4.3 Ayurvedic Aetiological Framework (Nidana)

Charaka Samhita Chikitsa Sthana 30/135–137 enumerates a remarkably comprehensive causal taxonomy across five domains. Table 2 presents a structured comparison with contemporary biomedical aetiological categories.

Table 2: Comparative Aetiological Framework – Ayurvedic Nidana vs. Modern Classification

Domain	Ayurvedic Nidana (C.Chi. 30/135–137)	Modern Biomedical Equivalent
Nutritional	Excessive dry, bitter, astringent, salty, sour foods; incompatible foods	Nutritional deficiencies (Zn, Se, folate); dietary oxidative load
Lifestyle	Excessive exercise (Ati Vyayam); suppression of ejaculation (Vega Ghatat)	Overtraining syndrome; scrotal hyperthermia; ejaculatory obstruction
Sexual Behaviour	Excessive coitus; unnatural sex; abstinence; dyspareunia	Psychosexual dysfunction; ejaculatory disorders; sexual frequency effects
Psychological	Excessive worry, depression, anxiety, anger, distrust	HPA axis dysregulation; cortisol-mediated gonadotrophic suppression

Domain	Ayurvedic Nidana (C.Chi. 30/135–137)	Modern Biomedical Equivalent
Traumatic/Iatrogenic	Penile trauma; surgical trauma; cauterisation; alkali application injuries	Genital trauma; iatrogenic obstruction; post-surgical azoospermia
Systemic Illness	Vyadhi Karshita (emaciation from chronic disease, e.g., TB)	TB, diabetes, thyroid disorders, obesity-related hypogonadism

4.4 Pathogenesis (Samprapti): Dosha-Based Mechanistic Pathway

The Ayurvedic Samprapti of Purush Vandhyatva, as described in Charaka Samhita Chikitsa Sthana 30/138, posits that vitiated Doshas — either singly or in combination — gain access to the Shukravaha Srotas (seminal-carrying channels) and produce qualitative or quantitative impairment of Shukra Dhatu. This mechanistic description maps onto contemporary concepts of local and systemic pathophysiological pathways affecting spermatogenesis and sperm function. Specifically, Vata Dosha vitiation producing Fenilam, Tanu, and Ruksha Shukra corresponds neurophysiologically to sympathetic nervous system dysregulation of the ejaculatory reflex arc and reduced seminal plasma secretion from the seminal vesicles. Contemporary research confirms that oxidative stress — a predominantly Pitta-mediated pathology in Ayurvedic terms — impairs sperm DNA integrity, mitochondrial membrane potential, and acrosomal function, directly impairing fertilisation capacity.[12,14]

Granthi Yukta Avasadi Shukra (lumpy, sedimenting semen due to ejaculatory suppression, C.Chi. 30/144) corresponds to conditions of obstructive pathology such as ejaculatory duct obstruction or post-inflammatory epididymal fibrosis, where stasis and altered seminal composition lead to sperm agglutination and necrospermia.[18]

4.5 Hereditary Reproductive Disorders: A Genomic Parallel

The classification of hereditary disorders in Ayurveda into Matruja Sahaj Vikarani (maternal/X-linked) and Pitruja Sahaj Vikarani (paternal/Y-linked) in Ashtanga Sangraha Sutra Sthana 22/3 represents a conceptual framework for sex-linked inheritance that predates Mendelian genetics by approximately 1,500 years. Four hereditary reproductive disorders are specifically enumerated:

1. Alpa-ayu Prajayate — short-lived offspring, conceptually paralleled with Aicardi syndrome (X-linked).
2. Virupa Prajayate — offspring with structural deformities, paralleled with chromosomal structural abnormalities.
3. Sahaj Klaibya — hereditary impotency/infertility, paralleled with Y-linked AZF microdeletions and Klinefelter syndrome (47XXY).
4. Garbha Prastravati — hereditary tendency for habitual abortion, paralleled with X-linked recessive conditions transmitted through carrier females.

Of particular andrological significance is Sahaj Klaibya under Pitruja Sahaj Vikarani. Contemporary genetic andrology identifies Y chromosome AZFa, AZFb, and AZFc microdeletions as the most frequent genetic causes of non-obstructive azoospermia and severe oligospermia, present in 5–10% of infertile men.[16,20] These are paternally transmitted in an exclusively Y-linked (paternal) manner — the precise transmission pathway envisioned by the Pitruja Sahaj Vikarani concept.

4.6 Modern Investigations and Their Ayurvedic Counterparts

Modern investigative parameters for male infertility have well-established Ayurvedic counterparts as identified in this review. Semen analysis parameters — total volume (3–5 ml), sperm count (60–120 million/ml), motility (80–90%), and morphology (≥80% normal forms) — directly assess the qualities described under the eight types of Shukra Dushti. FSH and LH assays assess pituitary-gonadal axis integrity (corresponding to Agni-mediated Dhatu transformation). Chromosomal karyotyping for Klinefelter syndrome (47XXY) validates the Dwireta/Stri-Purush Lingi concept described in Charaka Samhita Sharira Sthana 2/19 and Sushruta Samhita Sharira Sthana 2/44, representing individuals with atypical gender characteristics and infertility.[8]

5. DISCUSSION

5.1 Structural Parallels Between Ayurvedic and Biomedical Frameworks

The most striking finding of this review is the structural coherence between the Ayurvedic conceptual framework for Purush Vandhyatva and contemporary andrological classification — a congruence that cannot be attributed to coincidence given the independent epistemological origins of the two systems. The Ayurvedic eight-fold Shukra Dushti taxonomy is functionally equivalent to a macroscopic and qualitative semen analysis protocol, encompassing volume, viscosity, colour, odour, and consistency parameters.

Patil et al. (2020) conducted a systematic review of classical Ayurvedic descriptions of infertility and noted that the diagnostic precision of Shukra Dushti descriptions approaches that of historical clinical andrological texts from mediaeval Islamic medicine (Ibn Sina's Canon of Medicine), reflecting convergent empirical observation across medical traditions.[21] This finding validates the ecological validity of observational clinical knowledge accumulated over centuries of medical practice.

5.2 Oxidative Stress as a Pitta-Mediated Mechanism

The conceptual mapping of Pitta Dosha vitiation to oxidative stress in spermatogenesis deserves particular attention. Pitta in Ayurvedic physiology governs transformation, heat, and metabolic activity — properties that correspond functionally to reactive oxygen species (ROS) metabolism. Agarwal et al. (2014) demonstrated that excess ROS production by defective spermatozoa and activated seminal leukocytes constitutes a central pathway in male infertility, causing sperm DNA fragmentation, axonemal dysfunction, and mitochondrial membrane depolarisation.[12]

Several Vajikarana herbs demonstrate in vitro and in vivo antioxidant properties consistent with Pitta-pacifying (Pittahara) therapeutic action. Withania somnifera (Ashwagandha) root extract has been shown in a double-blind, placebo-controlled RCT by Ambiye et al. (2013) to significantly improve sperm count (167%), sperm motility (57%), and serum testosterone in infertile men, with concurrent reductions in seminal oxidative stress markers including malondialdehyde (MDA) and superoxide dismutase (SOD) levels.[22] Mucuna pruriens (Kapikacchu) similarly demonstrated significant improvements in sperm concentration, motility, and serum LH, FSH, and testosterone in a clinical study by Shukla et al. (2010), alongside reductions in lipid peroxidation.[23]

5.3 Psychogenic Infertility: Ayurvedic and Neuroendocrine Perspectives

The Ayurvedic identification of psychological causes including Chinta (excessive worry), Shoka (depression), Bhaya (anxiety), and Krodha (anger) as direct contributors to Shukra Dushti in Charaka Samhita Chikitsa Sthana 30/136 is validated by contemporary psycho-neuro-endocrinological research. Chronic psychosocial stress activates the hypothalamic-pituitary-adrenal (HPA) axis, elevating glucocorticoid levels that suppress gonadotrophin-releasing hormone (GnRH) pulsatility, thereby reducing LH and FSH secretion and impairing spermatogenesis.[24]

Furthermore, psychological distress has been shown to elevate seminal ROS levels independently of leukocyte activation, suggesting a direct neuroimmune pathway from psychological state to sperm quality.[25] This provides a molecular basis for the Ayurvedic Manas (mind)-Shukra (semen) relationship, where mental equilibrium (Satva) is considered a prerequisite for optimal reproductive function.

5.4 Genetic Concepts in Ayurveda: An Underappreciated Legacy

The Ayurvedic categorisation of Sahaj Klaibya under Pitruja Sahaj Vikarani represents perhaps the most sophisticated conceptual contribution of classical texts to reproductive genetics. The Bija (seed/gamete) model in Sushruta Samhita describes genetic information as residing within Bija-bhaga-avayava — discrete functional subunits of the gamete that adetermine specific organ development and characteristics. Acharya Charaka's concept of Upatapta Bija-bhag (heat-damaged gametic subunits causing specific organ abnormalities) in Charaka Samhita Sharira Sthana parallels the concept of locus-specific DNA damage or epigenetic modification causing targeted organ pathology in offspring.[9]

The contemporary genetic correlates of Y-linked male infertility — including AZF microdeletions, mutations in the NR5A1 gene (now identified in non-obstructive male infertility and Fröhlich's syndrome-like presentations), and Klinefelter syndrome karyotype — all conform to the paternal transmission pathway (Pitruja) envisioned by classical scholars.[16],[20]

5.5 Limitations of Current Integrative Research

Despite these structural parallels, the integrative research landscape suffers from significant methodological limitations. Existing clinical trials on Vajikarana formulations frequently lack adequate randomisation, blinding, and sample size calculation, rendering meta-analytic synthesis unreliable. Standardisation of herbal preparations — both chemical (phytochemical profiling, active compound quantification) and pharmaceutical (dosage forms, processing methods) — is inconsistent across studies.[17], [26] The absence of validated Dosha assessment instruments with psychometric properties comparable to standardised questionnaires used in conventional medicine (such as the International Index of Erectile Function, IIEF) further limits clinical trial design in this domain.

6. CONCLUSION

This critical integrative review establishes that the Ayurvedic concept of Purush Vandhyatva constitutes a sophisticated, multidimensional clinical entity that prefigures several key constructs of contemporary male reproductive medicine. The eight-fold Shukra Dushti taxonomy represents the earliest systematic semen classification in any documented medical tradition, with direct correspondence to modern macroscopic and microscopic semen analysis parameters. The multifactorial Nidana framework anticipates contemporary biomedical aetiological categorisation across nutritional, lifestyle, psychosexual, traumatic, and genetic domains.

The Dosha-based Samprapti maps onto known pathophysiological mechanisms including oxidative stress, inflammatory cascades, ejaculatory obstruction, and neuroendocrine suppression. The hereditary classification under Pitruja Sahaj Vikarani demonstrates remarkable conceptual alignment with Y-linked genetic transmission of infertility as understood in molecular andrology today.

However, the translation of this rich conceptual heritage into evidence-based clinical practice requires a concerted programme of methodologically rigorous research. Multidisciplinary collaboration between Ayurvedic scholars, andrologists, molecular biologists, and clinical epidemiologists is essential to design adequately powered RCTs with standardised outcome reporting, mechanistic studies linking Dosha vitiation to molecular spermatological pathways, and validated cross-system diagnostic instruments.

The rich tradition of Vajikarana Tantra, with its documented pharmacological potential in adaptogenic, antioxidant, and gonadotrophic activity, represents a substantial unexplored resource for the management of idiopathic male infertility — currently one of the most therapeutically challenging domains in reproductive medicine.

7. LIMITATIONS

This review carries several inherent limitations that must be acknowledged. As a narrative integrative review, it is subject to selection bias in the inclusion of primary sources. The translation and interpretation of Sanskrit Ayurvedic verses involve philological ambiguity, and different commentators (Tika scholars) have offered variant readings of certain passages. Additionally, the biomedical literature on Vajikarana herbal interventions is characterised by methodological heterogeneity that limits definitive conclusions. The absence of prospective clinical data from the present study means that all proposed mechanistic correlations remain theoretical hypotheses requiring experimental validation. Cultural and contextual differences in the meaning of reproductive failure across historical periods and geographic regions may also limit direct textual-clinical comparisons.

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