



BEYOND NUTRITION: STANYA(HUMAN MILK) AS A CARRIER OF NUTRITIONAL, NEURO-ENDOCRINE & GENE -REGULATORY SIGNALS. AN AYURVEDIC & BIO CHEMICAL PERSPECTIVE.

Ayurveda

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ABSTRACT

Background: Ayurveda describes stanya (human breast milk) as the principal nourishment of early life and relates its formation to the nutritional essence of maternal food. Contemporary lactation research characterises human milk as a dynamic biological system containing nutrients, immune factors, hormones, microorganisms, and regulatory RNAs. Objective: This review examines parallels and differences between Ayurvedic descriptions of stanya and contemporary evidence concerning maternal nutrition, psychological stress, milk cortisol, and milk-derived RNA. Approach: A narrative integrative review was developed from selected classical Ayurvedic texts and the biomedical literature cited in the source manuscript. **Findings:** Maternal diet influences several milk constituents, particularly fatty acids and selected micro nutrients, although some macro nutrients are comparatively stable. Stress and distress may affect milk ejection through neuroendocrine pathways, while associations between milk cortisol, immune markers, and later infant outcomes remain variable and largely observational. Milk contains microRNAs and other RNA species, but their uptake and functional effects in human infants are not yet established. Conclusion: Ayurvedic concepts provide a useful framework for discussing maternal nutrition and well being during lactation, but conceptual parallels should not be mistaken for proof of equivalent mechanisms. Clinical recommendations should follow the strength of contemporary evidence, and claims about herbs and milk-derived RNAs require further study.

KEYWORDS

Stanya; Human Milk; Ayurveda; Maternal Nutrition; Lactation; Psychological Stress; Cortisol; Microna; Kaumarabhrutya

INTRODUCTION

Human milk provides nutrition during early infancy while also delivering immune components, hormones, oligo saccharides, microorganisms, and other bio active substances. Its composition changes across lactation and varies between individuals. For this reason, milk is increasingly understood not simply as food but as a biological medium through which maternal physiology interacts with infant development [4-6].

Ayurvedic texts discuss stanya in relation to maternal nourishment, digestion, mental state, and infant well being. Stanya is described as an upadhatu of rasa dhatu, and the classical literature considers both the characteristics of satisfactory milk and factors believed to disturb it [1-3]. These descriptions arose within a traditional explanatory system and cannot be directly equated with modern biochemical categories. Nevertheless, they offer a historical framework for examining questions that remain relevant to lactation care: how maternal diet relates to milk composition, how emotional distress affects feeding, and whether milk carries signals involved in infant development.

This review considers these themes alongside contemporary research, with particular attention to the limits of the available evidence. The aim is to identify areas of convergence, clarify where the explanatory frameworks differ, and outline research questions suitable for integrative study.

Review approach

This manuscript is a narrative integrative review, not a systematic review. It brings together selected descriptions from the Charaka Samhita, Sushruta Samhita, and Kashyapa Samhita with the biomedical studies cited in the source manuscript on human-milk composition, maternal diet, oxytocin and milk ejection, milk cortisol, secretory immunoglobulin A, and milk-derived RNAs [1-23]. A reproducible database search strategy, formal screening process, and risk-of-bias assessment were not available in the source material. Accordingly, the discussion is descriptive, and the strength of conclusions is limited by the designs and findings of the cited studies.

Literature review

Ayurvedic understanding of stanya

Classical Ayurvedic accounts describe stanya as arising from the refined essence of digested nourishment (rasa) and being conveyed through the stanyavaha srotas. The Kashyapa Samhita gives particular attention to lactating women, the attributes of satisfactory milk (stanya sampat), and the concept of milk vitiation (stanya dushti) [1-3]. Descriptions of normal milk include a white appearance, an unctuous

quality, and the absence of abnormal taste or odour. Traditional texts also describe sensory and behavioral features associated with different patterns of stanya dushti [1-3].

These observations should be understood in their historical and theoretical context. Traditional sensory assessments are not validated substitutes for modern evaluation of milk composition, infant growth, or clinical illness. Their relevance to contemporary practice lies primarily in documenting the Ayurvedic framework and generating questions that can be tested using appropriate methods.

Maternal nutrition and milk composition

Ayurvedic recommendations for lactating women emphasize adequate nourishment and foods described as sweet, unctuous, and supportive of milk production. Shali and shashtika rice, wheat, green gram, ghee, milk, and selected foods and herbs are discussed in the classical literature; shatavari, yashtimadhu, vidari, and jivanti are among the substances described as stanyajanana [1-3]. The texts also caution against dietary patterns considered excessively pungent, sour, dry, or irritating.

Modern studies indicate that maternal diet affects some, but not all, components of human milk. Protein and lactose concentrations are relatively buffered, whereas milk fatty-acid composition and certain vitamins and trace elements may reflect maternal intake or nutritional status [4-6]. Maternal diet can also influence milk flavour, and early exposure to flavors through milk may affect later acceptance of related foods [7]. Human milk oligosaccharides vary substantially among women, with genetic factors playing a major role in this variation [8]. A randomized trial reported a possible galactagogue effect of Asparagus racemosus (shatavari), but the evidence is not sufficient to support broad conclusions about efficacy or safety across populations [9].

The evidence therefore supports a qualified relationship between maternal nutrition and milk composition. It does not establish that every dietary characteristic changes milk in a predictable way, nor that traditional dietary categories map directly onto individual nutrients.

Maternal emotional state and milk ejection

Ayurvedic texts advise that a lactating woman should be supported in maintaining a calm and positive mental state, and identify grief, anger, fear, and anxiety as factors that may disturb or reduce stanya [1-3]. In contemporary physiology, suckling stimulates oxytocin release, which contributes to milk ejection. Pain, anxiety, and acute stress can interfere with this reflex, even when milk synthesis itself is not necessarily reduced [10]. Skin-to-skin contact, practical breastfeeding

support, and a comfortable feeding environment may facilitate the feeding process and support maternal–infant interaction [10,11].

The parallel is strongest at the practical level: distress can make breastfeeding more difficult, and supportive care is important. It would be too strong, however, to interpret the classical concept of *stanya dushti* as equivalent to a specific neuro endocrine mechanism. Milk production, milk ejection, feeding frequency, and infant milk transfer are related but distinct outcomes and should be assessed separately.

Milk cortisol, immune factors, and infant outcomes

Cortisol can enter human milk, and milk cortisol concentrations vary with time of day and stage of lactation [12]. Cohort studies have reported associations between milk cortisol and infant temperament, while another study reported an association with later child body mass index [12-14]. Maternal stress and endocrine or immune status have also been examined in relation to milk secretory immunoglobulin A (sIgA), an important component of mucosal defence; findings are not uniform across studies [15].

These associations have prompted hypotheses that milk glucocorticoids may contribute to the development of the infant hypothalamic–pituitary–adrenal axis, gut maturation, or later metabolic outcomes [13-15]. However, observational associations do not establish causation. Maternal mood, socioeconomic circumstances, sleep, feeding patterns, infant characteristics, and other factors may influence both exposure and outcome. The available evidence does not justify concluding that ordinary maternal stress necessarily harms an infant. It does support taking maternal well-being seriously and providing appropriate emotional, social, and clinical support.

RNA species in human milk

Human milk contains RNA species associated with extracellular vesicles, including exosomes, as well as milk cells and fat globules. Research has focused particularly on microRNAs (miRNAs), some of which are associated with immune-related pathways [16,17]. Studies have also identified messenger RNA, transfer-RNA-derived fragments, and long non-coding RNAs in milk or milk-derived extracellular vesicles [18-20]. The evidence base is more developed for mRNAs than for several other RNA classes.

Experimental work has suggested that some milk-derived mRNAs may resist degradation under certain conditions and may interact with intestinal cells or pathways relevant to immunity and metabolism [16,17,21]. Nonetheless, the extent to which these RNAs are absorbed, remain biologically active, and exert clinically meaningful effects in human infants remains uncertain [19-21]. Studies have reported associations between milk mRNA profiles and maternal weight characteristics or premature delivery [22,23], but these findings do not establish that particular foods directly alter milk RNA content. A plausible hypothesis is that maternal metabolic status, inflammation, and mammary-gland physiology influence RNA cargo; direct human evidence linking specific dietary exposures to particular milk mRNA or tRNA profiles remains limited.

The Ayurvedic relationship between *stanya*, *rasa*, and *agni* can be considered a broad conceptual parallel to the idea that maternal physiology contributes to the properties of milk. It should not be presented as a prior description of RNA biology. Any proposed correspondence requires direct empirical testing.

DISCUSSION

The literature reviewed here suggests three areas in which Ayurvedic descriptions and contemporary lactation research can be considered alongside one another: maternal nourishment and milk composition, maternal emotional state and breastfeeding, and the role of milk as a carrier of biological signals. The nature of the evidence differs across these areas, and the distinctions are important.

First, both frameworks give importance to maternal nourishment. Modern evidence supports effects of maternal diet on selected milk fatty acids and micro nutrients, while also showing that some components are relatively stable and that variation in other constituents may be driven by genetics or factors beyond diet [4-8]. Ayurvedic dietary recommendations can therefore be discussed as part of the history of maternal-care practice, but individual foods or regimens should be evaluated according to contemporary evidence, local nutritional needs, and safety. Traditional galactagogues,

including *shatavari*, warrant better-designed studies before firm clinical claims are made [9].

Second, the emphasis on maternal calm during feeding has a plausible practical counterpart in the physiology of milk ejection and in evidence supporting responsive, supportive breastfeeding care [10,11]. This does not mean that a mother is responsible for breastfeeding difficulties because she is anxious or distressed. Lactation is influenced by multiple physiological, psychological, social, and clinical factors. Advice should avoid blame and instead prioritize compassionate support, assessment of feeding and milk transfer, and treatment of maternal distress when needed.

Third, research on cortisol and milk-derived RNAs expands the understanding of human milk beyond its nutritional role. The current literature is promising but contains substantial uncertainty. Studies linking milk cortisol to temperament or growth are largely observational, and proposed effects of milk RNAs on infant development require stronger evidence of uptake, biological activity, and clinical relevance [12-23]. The fact that a molecule is detectable in milk does not by itself establish that it reaches a target tissue or causes a developmental effect.

For integrative scholarship, the most defensible approach is to distinguish conceptual similarity from mechanistic equivalence. Terms such as *rasa*, *agni*, and *stanya dushti* belong to an Ayurvedic explanatory system; nutrients, oxytocin, cortisol, immunoglobulins, and RNAs are investigated through different contemporary methods. Mapping one directly onto another without validation risks oversimplification. A productive research programme could examine defined Ayurvedic dietary interventions using prospective designs, standardised maternal dietary assessment, milk-composition analysis, lactation outcomes, and infant growth or immune measures. Studies of herbal galactagogues should also report dose, product quality, adverse events, and clinically meaningful outcomes.

This review has limitations. It is narrative rather than systematic, and the source manuscript did not provide a reproducible literature-search strategy or formal appraisal of study quality. The conclusions are therefore intended to identify themes and research priorities, not to establish clinical efficacy or causal mechanisms.

CONCLUSION

Stanya occupies an important place in Ayurvedic descriptions of infant nutrition and maternal care. Contemporary evidence confirms that human milk is a dynamic biological fluid whose composition reflects a combination of maternal nutrition, physiology, lactation stage, and other influences. Maternal distress can affect the feeding process, while reported associations involving milk cortisol, immune factors, and milk-derived RNAs remain subject to important uncertainties.

The most useful integration of these traditions is cautious and evidence-led. Adequate maternal nutrition, practical breastfeeding support, rest, and attention to emotional well-being are reasonable components of lactation care. Specific herbal effects and proposed RNA-mediated developmental outcomes should not be overstated. Further well-designed clinical and translational studies are needed to determine which traditional practices offer measurable benefits and how maternal and milk-related biological factors influence infant outcomes.

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