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Research Article

Evaluation of hydration and unctuousness of skin in female volunteers of Ras sara-asara using non-invasive objective method: A cross sectional analytical study

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Abstract

Background: *Ayurveda* classifies individuals based on *Dhatu Sarata*, where *Rasa Sarata* (superior quality of *Rasa Dhatu*) is associated with better skin hydration and unctuousness. However, objective scientific validation of this concept remains limited. This study aimed to evaluate skin hydration and unctuousness in female volunteers as *Rasa Sarata* and *Rasa Asarata* by using a non-invasive digital moisture meter. Methods: A cross-sectional analytical study was conducted on 82 healthy female volunteers aged 20–28 years, categorized into *Rasa Sarata* (n=41) and *Rasa Asarata* (n=41) groups based on standard Ayurvedic parameters. Skin hydration and oil levels were measured at five anatomical sites (face, forehead, arm, opisthenar, and ocular region) using the SK-IV Digital Moisture Meter. Data were analyzed using the Mann-Whitney test to compare hydration and unctuousness between the groups. Results: *Rasa Sarata* individuals exhibited significantly higher hydration and oil levels across all measured sites compared to *Rasa Asarata* individuals ($p < 0.05$). Regional variations were observed, with the highest hydration and unctuousness levels in the facial and ocular regions. Conclusion: This study provides scientific validation for Ayurvedic *Rasa Sarata* and *Rasa Asarata* classifications by demonstrating measurable differences in skin hydration and unctuousness. The findings highlight potential applications in personalized skincare, integrating Ayurvedic diagnostics with modern bioengineering tools for dermatological and cosmetic advancements. Further research incorporating biochemical markers and *Ayurvedic* interventions can enhance our understanding of *Rasa Dhatu's* role in skin physiology.

Keywords: *Rasa Sarata, Rasa Asarata*, Skin hydration, Skin unctuousness, Non-Invasive Moisture Meter, SK-IV Digital Moisture Meter

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Introduction

Skin, the largest organ of the human body, acts as a protective barrier against environmental factors, pathogens, and dehydration. Maintaining optimal hydration and unctuousness is essential for dermatological health and aesthetics. *Ayurveda* classifies individuals based on *Dhatu Sarata*, which reflects the qualitative and functional status of bodily tissues. *Rasa Dhatu*, the first and most fundamental *Dhatu*, significantly influences skin health by determining hydration and texture (1). Individuals with *Rasa Sarata* exhibit well-hydrated, smooth, and lustrous skin, whereas those with *Rasa Asarata* experience dryness and reduced vitality (2). Skin hydration primarily depends on the stratum corneum, the outermost layer of the epidermis, which regulates transepidermal water loss (TEWL). Factors such as lipid composition, sebaceous gland activity, and the natural moisturizing factor (NMF) contribute to maintaining hydration (3). *Snigdhatva* (unctuousness) relates to the presence of adequate sebum and moisture, preventing excessive dryness and skin disorders (4).

Modern dermatology recognizes that proper hydration and balanced sebum production support skin elasticity, prevent premature aging, and aid wound healing (5). Various intrinsic and extrinsic factors, including age, diet, hydration levels, genetic predisposition, and environmental exposure, influence skin hydration and unctuousness (6). Research indicates that hydration levels decline with age due to reduced lipid production and structural changes in the dermal matrix (7), while exposure to pollutants, ultraviolet (UV) radiation, and harsh climatic conditions accelerates dehydration and oxidative stress, leading to skin aging and barrier dysfunction (8). Despite the *Ayurvedic* emphasis on *Rasa Sarata*, there is limited objective evidence correlating it with modern dermatological parameters such as hydration and unctuousness. Although previous studies highlight the significance of skin moisture in overall health and susceptibility to external insults, scientific validation of *Ayurvedic* concepts using contemporary bioengineering tools remains inadequate (9).

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Recent advancements in non-invasive techniques, such as digital moisture meters, allow accurate and reproducible assessment of skin hydration and sebum levels (10). These developments present an opportunity to integrate *Ayurvedic* diagnostics with evidence-based dermatology. This study aims to evaluate skin hydration and unctuousness in female volunteers classified under *Rasa Sarata* and *Rasa Asarata* using a non-invasive digital moisture meter. By merging traditional *Ayurvedic* assessment with modern dermatological tools, this research seeks to establish a scientific basis for *Dhatu Sarata* classification in skin health, potentially influencing personalized skincare, *Ayurveda*-based dermatology, and the development of targeted cosmetic and therapeutic interventions.

Ayurveda classifies individuals based on *Dhatu Sarata,* representing tissue quality, with *Rasa Dhatu Sarata* indicating skin hydration and oil balance. However, a lack of scientific validation persists. This study bridges traditional *Ayurvedic* principles with modern dermatological assessment using a moisture meter to measure hydration and unctuousness levels. Establishing measurable skin differences between *Rasa Sarata* and *Rasa Asarata* individuals provides scientific support for *Ayurvedic* skin assessment, aiding personalized skincare and health management. The primary aim of this study is to evaluate hydration and unctuousness of the skin in female volunteers classified under *Rasa Sarata-Asarata* using a non-invasive, objective method, specifically a moisture meter, in a cross-sectional analytical study.

Materials and methods

This cross-sectional analytical study was conducted by following STROBE guidelines at the Shree Ayurveda Mahavidyalaya and Hospital, Nagpur. The study aimed to assess skin hydration and unctuousness in female volunteers of *Rasa Sarata-Asarata* using a non-invasive moisture meter. Ethical approval was obtained from the Institutional Ethics Committee, and written informed consent was taken from all participants.A total of 170 individuals were screened, out of which 82 participants were selected based on inclusion and exclusion criteria. Participants were divided into two groups: Group A *(Rasa Sarata)* with 41 individuals and Group B *(Rasa Asarata)* with 41 individuals. The classification of participants into *Rasa Sarata* and *Rasa Asarata* groups was carried out using the standard Dhatu Sarata assessment proforma prescribed by MUHS and published in the Textbook of Practical *Kriya Sharir*. The proforma consists of 20 characteristic features of *Rasa Dhatu* as described in classical *Ayurvedic* texts, covering both physical and psychological attributes such as skin texture and softness, natural luster, clarity of voice, emotional responsiveness, and facial glow, moisture of lips and tongue, and strength of mind (*Satva Bala*). Each feature was scored as present (1) or absent (0). Individuals with ≥70% (≥14 out of 20) matching features were classified as *Uttam Sarata*, while those with ≤35% (≤ 7 out of 20) were categorized as *Hina Sarata*. Inclusion criteria included healthy females aged 20-28 years, residing within a 50 km radius, with no systemic or dermatological conditions affecting skin hydration. Exclusion criteria included Participants with systemic disorders such as diabetes or thyroid dysfunction, dermatological conditions (eczema, psoriasis, severe acne), recent use of corticosteroids or hormonal therapy, recent travel to different climatic zones, pregnant or lactating women. Skin hydration and oil levels were measured using the SK-IV Digital Moisture Meter, which employs Bioelectrical Impedance Analysis (BIA). Measurements were taken at five standardized skin sites (forehead, cheek, opisthenar, ocular region, and forearm), with each reading averaged over three trials.

Primary outcomes included evaluating hydration and unctuousness of the skin in *Rasa Sarata-Asarata* individuals. Secondary outcomes involved establishing normal hydration and oil levels and correlating *Rasa Sarata* features with dermatological parameters. *Rasa Sarata* individuals exhibited superior skin hydration and oil balance (13), while *Rasa Asarata* individuals had lower hydration and oil content, leading to dry and rough skin (14). Data were analyzed using STATA version 14.0. Categorical variables were assessed using the Chi-square test, while continuous variables were compared using an independent t-test. Pearson's correlation coefficient examined relationships between *Rasa Sarata* and skin hydration. A p-value <0.05 was considered statistically significant. Future recommendations include integrating *Ayurvedic* principles with dermatological tools, considering seasonal variations, expanding research to male participants, and exploring biochemical markers such as skin lipids and collagen levels to strengthen correlations.

Figure 1: Picture of SK-IV moisture meter

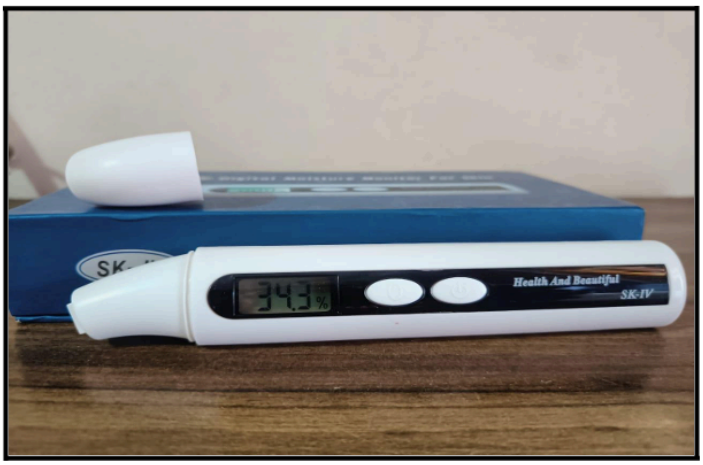


Figure 2: Photo of participant

Observations and Results

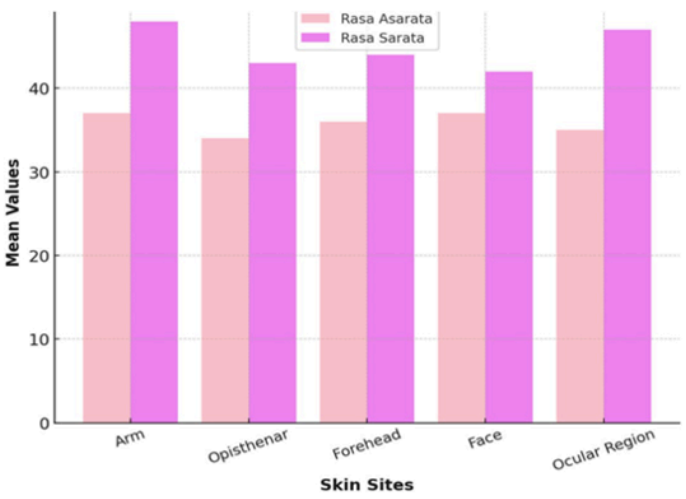
The study assessed skin hydration and unctuousness in 82 female volunteers *(41 Rasa Sarata, 41 Rasa Asarata)* using a moisture meter. *Sarata Parikshan* was conducted based on physical and

psychological traits using the MUHS standard proforma for *Dhatu Sarata* published in the Textbook of Practical *Kriya Sharir* (16) Measurements were taken at five skin regions (arm, opisthenar, forehead, face, and ocular region).

Data were analyzed using STATA 14.0, with continuous variables presented as Mean ± SD and categorical variables assessed using chi-square and Fisher's exact tests. Independent t-tests compared hydration and unctuousness between groups, with $p < 0.05$ considered statistically significant. Results were categorized into demographic analysis and comparative analysis.

A significant SES difference was noted: 26.83% of *Rasa Sarata* individuals were upper class, compared to 2.22% in *Rasa Asarata*. The middle class was dominant in *Rasa Asarata* (90.24%), while *Rasa Sarata* had 68.29%. The findings suggest *Rasa Sarata* individuals tend to belong to higher SES.

Graph 1: Comparison of characteristics of hydration level between *Rasa Sarata* and *Rasa Asarata*



The study found that *Rasa Sarata* individuals consistently had higher skin hydration levels across all assessed regions compared to *Rasa Asarata* individuals, with statistically significant differences ($p< 0.001$).

Hydration levels were significantly greater in the arm (47.89 vs. 38.02), opisthenar (42.70 vs. 35.60), forehead (43.65 vs. 37.27), face (42.30 vs. 37.67), and ocular region (45.84 vs. 36.51) in the *Rasa Sarata* group. The most pronounced difference was seen in the ocular region, while other areas also showed highly significant variations.

These results confirm that *Rasa Sarata* individuals retain more moisture, supporting the Ayurvedic concept of *Rasa Dhatu's* role in skin health. The findings bridge traditional Ayurvedic classification with modern dermatological assessments, validating its relevance through objective scientific measurement.

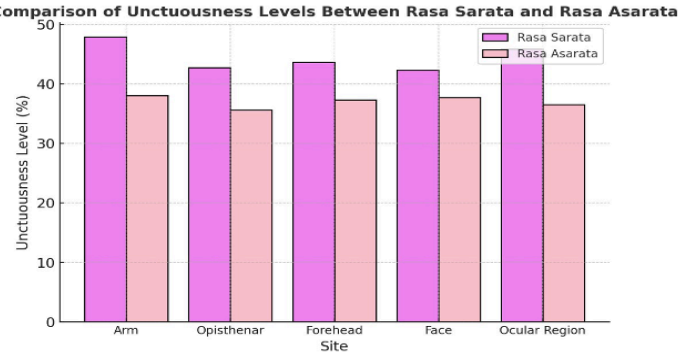
The study revealed a statistically significant difference ($\chi^2 = 24.36$, $p < 0.001$) in skin hydration levels between *Rasa Sarata* and *Rasa Asarata* groups. Both groups had an equal proportion of participants (2.44%) with very dry skin, indicating no major variation in this category. However, dry skin was significantly more common in *Rasa Asarata* (31.71%) compared to *Rasa Sarata* (2.44%), suggesting that dryness is more prevalent in the *Rasa Asarata* group.

Table 2: Comparison of Hydration Range between *Rasa sarata* and *Rasa Asarata*

Hydration Range	*Rasa Asarata*	*Rasa sarata*	p-value
	N	N	
Very dry skin	1	1	Chi2=24. 36 d.f.=3 p<0.001 HS
Dry Skin	13	1	
Normal	27	25	
Moist skin	0	14	

The majority of participants in both groups fell under the normal hydration category, with 60.98% in *Rasa Sarata* and 65.85% in *Rasa Asarata*, showing a relatively balanced distribution. A significant contrast was observed in the moist skin category, where 34.15% of *Rasa Sarata* individuals had well-hydrated skin, whereas none from the *Rasa Asarata* group fell into this range. These findings confirm that *Rasa Sarata* individuals tend to have higher skin moisture levels, while *Rasa Asarata* individuals are more prone to dryness, supporting the Ayurvedic classification of *Rasa Sarata* and *Rasa Asarata* with measurable dermatological differences.

Graph 2: Comparison of Unctuousness level (%) between *Rasa Sarata* and *Rasa Asarata*.



Comparison of Skin Unctuousness between *Rasa Sarata* and *Rasa Asarata*

Rasa Sarata individuals exhibit higher unctuousness across most skin regions compared to *Rasa Asarata*. Significant differences were observed in the arm (23.83 vs. 21.83, $p = 0.0151$), opisthenar (22.57 vs. 20.68, $p = 0.0125$), face (23.29 vs. 21.23, $p = 0.0164$), and ocular region (24.06 vs. 21.78, $p = 0.0065$). Although forehead unctuousness was higher in *Rasa Sarata* (26.05 vs. 23.92), it was not statistically significant ($p = 0.0990$). These findings support the Ayurvedic concept of *Sarata*, showing a measurable link between skin oil content and *Sarata* classification.

Comparison of Hydration and Unctuousness Changes Between *Rasa Sarata* and *Rasa Asarata*

Rasa Sarata individuals show significantly higher hydration and unctuousness levels across most skin regions compared to *Rasa Asarata*. The differences are highly significant in the arm (24.05 vs. 16.18, $p < 0.0001$), opisthenar (20.12 vs. 14.92, $p = 0.0005$), forehead (17.6 vs. 13.34, $p = 0.0049$), and ocular region (21.78 vs. 14.73, $p < 0.0001$). Although the face also showed higher values in *Rasa Sarata* (19.00 vs. 16.43), it was not statistically significant ($p = 0.1028$). These findings suggest greater moisture and oil retention in *Rasa Sarata* individuals, supporting Ayurvedic principles of tissue quality differences between the groups.

Table 3: Comparison of change in characteristics of Hydration level and Unctuousness level (%) between *Rasa Sarata* and *Rasa Asarata*

Change between Hydration & Unctuousness	*Rasa Asarata*		*Rasa Sarata*		t-value	p-value
	Mean	SD	Mean	SD		
ARM	16.18	7.16	24.05	8.66	4.4809	<0.0001, HS
Opisthenar	14.92	6.07	20.12	6.82	3.6471	0.0005, HS
Forehead	13.34	6.25	17.6	7.04	2.8924	0.0049, HS
Face	16.43	6.56	19.00	7.50	1.6501	0.1028, NS
ocular region	14.73	6.35	21.78	7.73	4.5121	<0.0001, HS

Discussion

This observational study aimed to objectively assess the hydration and unctuousness of skin in female volunteers classified into *Rasa Sarata* and *Rasa Asarata* groups. The results demonstrated that individuals with superior *Rasa Dhatu Sarata* exhibited significantly higher hydration and oil levels across various skin regions compared to those with *Rasa Asarata*. These findings support the Ayurvedic assertion that *Rasa Sarata* individuals possess superior tissue quality, which directly contributes to better moisture retention and overall skin health.The study's use of a non-invasive digital moisture meter provided objective and reliable measurements of hydration and oil levels, reinforcing the credibility of Ayurvedic principles through scientific validation. The consistent disparities observed across all measured regions align with the Ayurvedic descriptions of *Rasa Dhatu's* role in skin nourishment and hydration, suggesting that traditional Ayurvedic classifications can be substantiated with empirical data. This supports previous research that suggests a strong correlation between *Rasa Dhatu* quality and skin hydration levels.(15) Several factors contribute to the hydration and unctuousness of the skin, as described in Ayurveda. The primary factor is the quality of *Rasa Dhatu*, which serves as the first tissue formed after digestion and is responsible for nourishing all other *Dhatus,* including the skin. Well-nourished *Rasa Dhatu* ensures optimal fluid retention, leading to hydrated and smooth skin.(17)

Additionally, *Kapha Dosha* plays a crucial role in maintaining the skin's natural moisture balance due to its *Snigdha* (unctuous) and *Manda* (slow) qualities. A balanced *Kapha Dosha* prevents transepidermal water loss (TEWL) and supports the skin's protective barrier, which is essential for maintaining hydration and oil balance.(18) The *Mahabhutas*, particularly *Apas* (water) and *Prithvi* (earth), also contribute to skin texture and moisture retention. *Apas* ensures adequate hydration, while *Prithvi* provides structural support and density. An imbalance in *Vayu* (air) can lead to increased dryness, highlighting the importance of maintaining elemental balance for optimal skin health. (19) Furthermore, the concept of *Ashraya-Ashrayi Bhava*, which describes the mutual dependency of *Kapha Dosha* and *Rasa Dhatu*, explains how both work together to sustain *Snigdhta* and *Mruduta* in the skin. This principle, described in *Sushruta Samhita*, further validates the strong connection between Ayurveda and dermatological health. (20)

Another essential aspect is the role of *Rasa Dhatu Mala* (byproducts), particularly *Kapha*, which acts as a natural moisturizer for the skin. The presence of sufficient *Kapha* as a byproduct of *Rasa Dhatu* metabolism helps in reducing TEWL and maintaining skin hydration. This aligns with Ayurvedic principles that recognize *Kapha* as essential for skin lubrication and moisture retention.(21) Moreover, *Agni* (digestive fire) plays a pivotal role in determining *Rasa Dhatu* quality. A well-functioning *Agni* ensures proper digestion and nutrient assimilation, leading to well-nourished *Rasa Dhatu* and, consequently, better skin hydration. Weak *Agni*, on the other hand, may lead to dryness and inadequate skin nourishment.(22) The influence of *Ahara* (diet) and *Prakriti* (constitution) on skin hydration further reinforces Ayurveda's holistic approach. A diet rich in *Snigdha* (unctuous) and *Madhura* (sweet) foods, such as ghee, milk, and nuts, supports *Rasa Dhatu* nourishment and enhances skin hydration. Similarly, *Prakriti* influences skin characteristics, with *Kapha Prakriti* individuals naturally having better skin moisture levels compared to *Vata*-dominant types, who are more prone to dryness due to their inherent *Ruksha* (dry) quality.(23) This study's findings align with previous research in Ayurvedic dermatology, which has primarily focused on Dosha-based skin classification. Patwardhan and Chopra (2018) reported that individuals with high *Rasa Dhatu* exhibit enhanced skin moisture, a claim supported by the present study's results.(24)

Additionally, modern dermatology has established hydration as a key factor for maintaining skin elasticity, reducing aging, and enhancing barrier function, which parallels Ayurvedic descriptions of *Rasa Sarata* individuals possessing resilient and hydrated skin. (25) However, certain contradictions were noted, as some *Rasa Asarata* individuals displayed comparable hydration and unctuousness levels in specific skin regions. Ayurvedic texts provide plausible explanations for such variations, emphasizing that factors such as *Prakriti*, seasonal changes *(Ritucharya),* diet, lifestyle, and mental state *(Sattva)* significantly influence skin hydration.(26) For instance, *Kapha*-dominant individuals may exhibit naturally higher moisture levels, even if classified as *Rasa Asarata*.(27) while seasonal changes can temporarily affect skin hydration patterns.(28)These findings highlight the comprehensive nature of Ayurvedic diagnostics, which consider multiple interrelated factors in assessing skin health rather than relying solely on *Sarata* classification.(29) Overall, this study contributes to the ongoing effort to empirically validate Ayurvedic principles using modern scientific methods. The correlation between *Rasa Dhatu* quality and skin hydration, as measured by digital moisture analysis, reinforces Ayurveda's holistic approach to health and wellness.(30)The results suggest that Ayurvedic concepts can serve as a valuable framework for understanding skin health and could be integrated with dermatological research to develop personalized skincare strategies.(31) Future studies should explore a broader age range and incorporate additional biomarkers to further substantiate the role of *Rasa Dhatu* in skin hydration.(32) Additionally, longitudinal studies assessing seasonal and dietary influences on skin moisture could provide deeper insights into the dynamic nature of *Rasa Dhatu* and its effects on skin health.(33)

Conclusion

This study validates the Ayurvedic classification of *Rasa Sarata* and *Rasa Asarata* as key determinants of skin hydration and oiliness. *Rasa Sarata* individuals showed consistently higher hydration and oil levels, linking this trait to physiological skin characteristics. By integrating non-invasive measurements, the study bridges Ayurveda with modern dermatology, supporting traditional diagnostics. While regional variations existed, the trend remained: *Rasa Sarata* had higher hydration, while *Rasa Asarata*

was prone to dryness. These findings open avenues for personalized skincare based on *Sarata* assessments. Further research on biochemical markers, diet, seasonal changes, and Ayurvedic treatments could deepen our understanding of *Rasa Dhatu's* role in skin health.

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