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## Exploring the Ayurveda Physiology behind Transdermal Absorption of Any Skin Application: A Conceptual Study to Establish the Ayurveda Physiology W.S.R. to Suśruta Saṁhitā

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### ABSTRACT:

Transdermal drug delivery is a therapeutic approach that aligns closely with the fundamental principles of Ayurveda. It can be said that Bhrajaka pitta, a subtype of Pitta dosha which is mainly present in Twak (Skin) is responsible for metabolism of substances that comes in contact by the procedures such as Lepa, Abhyanga, Pariseka etc. According to Sushruta Samhita Twak (Skin) has 7 layers associated with specific physiological functions and pathologies. Tantrayukti is used to collect and analyze references from sushruta samhita to explain the route of transdermal absorption of substances with the role of Bhrajaka pitta, Dhamanis (Vascular channels) in umbilical region, which attributes in the process of distribution of absorbed substance throughout the body. The absorption also depends upon the substance and method used externally. Hence, this study is fully conceptual and based on textual references. For future researches experimental studies can be conducted to study pharmacokinetics of Ayurvedic topical formulations and its absorption compared to modern system to refine the Ayurvedic physiology of absorption.

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## INTRODUCTION:

Ayurveda, the ancient Indian system of medicine, offers a holistic approach to health and healing, emphasizing harmony between body, mind, and spirit. Topical applications (lepa, abhyanga, pradeha) have been central to Ayurvedic therapeutics for centuries. One of the key mechanisms by which these substances exert their effects is through transdermal absorption.

While modern pharmacology has established a robust understanding of transdermal drug delivery [16–20], Ayurvedic literature provides limited explicit explanations of this process. Kuhn’s philosophy of scientific paradigms underscores the importance of interpreting Ayurveda within its own framework rather than imposing external standards [5]. Thus, exploring classical texts—especially the Suśruta Saṃhitā—allows us to construct a conceptual model of transdermal absorption rooted in Ayurvedic physiology [1–3]. The Aims and objectives of this article is to explore the Ayurveda physiology behind transdermal absorption by means of Ayurveda principles and terms (i.e. from Rachana sharira), to compile and correlate the various references from Sushrut Samhita as well as its available commentaries and to infer and establish a conceptual framework for transdermal absorption based on Ayurveda principles by using classical tool of Tantrayukti.

## REVIEW OF LITERATURE:

Modern research has extensively studied transdermal absorption, with over 35,000 articles indexed globally and nearly 4,000 on PubMed alone [6,7,16–20]. These works focus on skin permeability, pharmacokinetics, and drug delivery systems.

Ayurvedic research has examined twak sharira (skin anatomy) from both classical and modern perspectives. Notable contributions include Roy (2017) [8], Balkrishna (2018) [9], Kond (2019) [10], Badhoria (2020) [11], Gupta (2020) [12], Saini (2020) [13], Rashmi & Sathish (2021) [14], and Verma (2023) [15]. Despite these contributions, no study has systematically established a fundamental conceptual framework for transdermal absorption in Ayurveda physiology.

## Embryological Basis of Skin Formation

Classical Ayurvedic discourse compares the formation of skin to the emergence of cream upon heating milk. The integument is described as arising from the digestion of śukra (semen) and śoṇita (blood), organized into seven distinct layers [21]. Each layer possesses unique structural characteristics and serves as the locus of specific pathological conditions (Table 1).

SN	Name	Parmāṇa (measurement)	Site for Diseases
1.	Avabhāsini	1/18th part of vr̥hi (rice grain)	Śidhma and Padmakāntaka.
2.	Lohitā	1/16th part of vr̥hi	Tilakālaka, Nyacchā, and Vyanga
3.	Śvetā	1/12th part of vr̥hi	Carmaṇḍala, Ajagallī, and Māṣaka
4.	Tāmra	1/8th part of vr̥hi	various types of Kilāsa and Kuṣṭha.
5.	Vedinī	1/5th part of vr̥hi	Kuṣṭha and Visarpa.
6.	Rohiṇī	which measures about a vr̥hi	Granthi, Apacī, Arbuda, Ślipada, and Gala-gaṇḍa.
7.	Māmsadharā	which measures about two vr̥hi	Bhagandara, Vidradhi, and Arśas.

## Functional Role of Avabhāsini

The first layer, termed Avabhāsini, imparts luminosity to all colors and five varieties of shades [22]. Ācārya Dalhaṇa, in his commentary, attributes this function to Bhrājaka Pitta [23].

## Functional Role of Bhrājaka Pitta

Suśruta emphasizes that Bhrājaka pitta, localized in the skin, metabolizes substances that come into contact with it through therapeutic procedures such as massage (abhyanga), sprinkling (pariṣeka), immersion (avagāha), and topical applications (lepa) [24].

## Vascular Pathways and Absorption Mechanisms

From the umbilical region arise four transverse arteries (Dhamani), which undergo repeated bifurcation into innumerable branches. These branches connect with hair follicles, facilitating nourishment through bodily fluids and sustaining sweat glands. Moreover, the active principles (vīrya) of externally applied substances are metabolized within the skin and subsequently absorbed into systemic circulation via these vascular branches [25].

## Tantrayukties

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*Tantrayukti* provides systematic methods for structuring both the wording (*vākyayojana*) and the intended meaning (*arthayojana*) of a text. It serves to refute statements made by opponents or those based on false reasoning (*asadvādi*), and it also helps establish one's own statements. Thus, *Tantrayukti* is both defensive (rejecting faulty arguments) and constructive (supporting valid reasoning). Whether the statements are clear (*vyaktā*), implied (*nokta*), hidden in meaning (*arthalīnā*), pure (*anirmalā*), or concise (*leśoktā*), *Tantrayukti* refines and clarifies them [26].

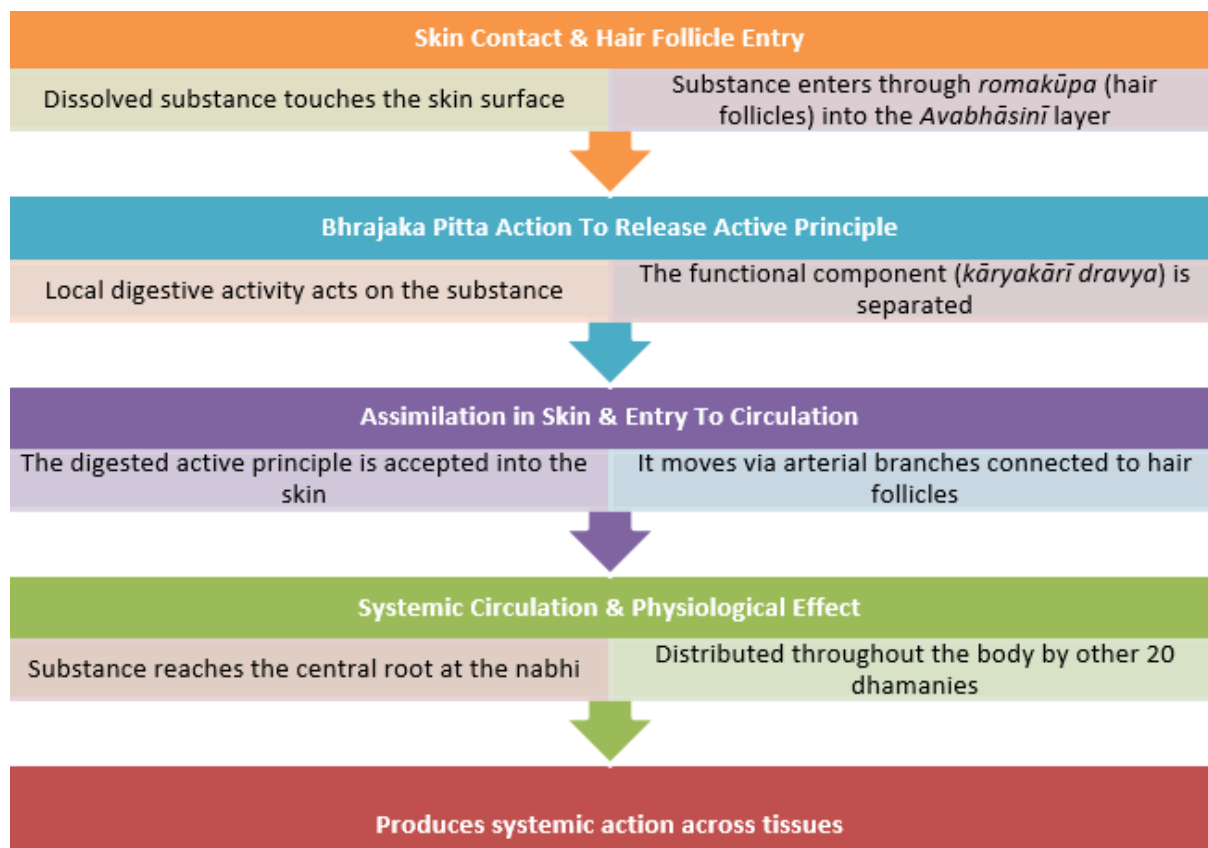
Thus, *Tantrayukti* acts as a methodological device ensuring that *śāstras* are communicated with precision, defended against misinterpretation, and refined for clarity. It is not merely ornamental but essential for the integrity of textual transmission and interpretation.

## DISCUSSION

The *Suśruta Saṃhitā*, recognized as a seminal surgical treatise, presents an elaborate account of anatomical structures indispensable for surgical practice. Consequently, when the interpretation of physiological functions in relation to anatomical organization is undertaken, it is methodologically appropriate to accord primacy to the *Suśruta Saṃhitā* over other classical texts.

To facilitate precise comprehension, Ācārya *Suśruta* delineates thirty-two interpretative devices (*tantrayukti*), which systematize seemingly disjointed statements, elucidate obscure meanings, and establish coherence. Among these, contextual analysis (*prasanga*), examination of antecedent and subsequent references (*aṭītāvekṣaṇa* and *anāgatāvekṣaṇa*), and logical inference (*ūhya*) are particularly instrumental in enabling rigorous understanding of complex subjects [27].

On the basis of *Tantrayukti*, when the scattered references from the *Suśruta Saṃhitā* are brought together, the physiological process of absorption through the skin becomes evident. It is described as follows;



Thus, from an Ayurvedic perspective, the physiology of cutaneous absorption is articulated with precision. This

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framework provides a cogent explanation of how therapeutic interventions such as massage, sprinkling, immersion, and topical applications exert their pharmacological effects, thereby enriching the understanding of Ayurvedic physiology.

Unlike previous works, this study situates transdermal absorption within the dosha–dhatu–agni paradigm, establishing it as a legitimate physiological process in Ayurveda. This enriches Ayurveda’s internal logic and provides a framework for correlating classical insights with modern dermatology [16–20].

#### LIMITATIONS AND FUTURE SCOPE:

This study is primarily conceptual and qualitative, relying on textual analysis of classical sources [1–3]. The absence of empirical data limits direct measurement of transdermal absorption in Ayurvedic terms. Interpretations may vary depending on translation and commentary.

Future research should focus on experimental validation of the conceptual framework. Controlled studies could investigate the pharmacokinetics of Ayurvedic topical formulations, correlating absorption patterns with the layered structure of *twak sharira*. Comparative studies between Ayurvedic therapies and modern transdermal systems may provide valuable insights [16–20]. Interdisciplinary collaborations could refine methodologies and establish standardized protocols for studying transdermal absorption in Ayurveda.

#### CONCLUSION:

Ayurveda, particularly through the *Suśruta Samhitā*, provides a rich conceptual basis for understanding transdermal absorption. By interpreting classical references with tools like *Tantrayukti* and correlating them with modern science, a fundamental framework can be established [1–3,5,16–20]. By correlating these references through the framework of *tantrayukti*, it becomes evident that the active principles of substances applied to the skin gain entry into the body through a defined physiological process.

This contributes to the advancement of Ayurveda physiology and its integration with contemporary biomedical research, ultimately supporting the development of more effective topical therapies.

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