

Short Communication



# Hormonal Vulnerability Patterns in Vulvar Dermatoses: A Life-Stage Classification Framework

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## Abstract

Vulvar dermatoses are challenging to diagnose due to overlapping clinical features and variable expression across life stages. We propose a life-stage hormonal vulnerability framework, integrating endocrine transitions, immune modulation and microbial influences across puberty, reproductive years, pregnancy/postpartum and menopause. Conditions are categorised into oestrogen-deficiency-associated, hormonal-fluctuation-associated, immune-dominant and microbiome-influenced disorders. This framework offers a novel, clinically relevant model to contextualise symptoms, guide interdisciplinary assessment and inform research on mechanisms underlying vulvar disease.

**Keywords:** Hormonal Vulnerability Patterns; Vulvar Disease; Framework

## Introduction

Vulvar dermatoses encompass a heterogeneous group of inflammatory, immune-mediated and infectious disorders affecting the female genital skin and mucosa. Accurate diagnosis can be challenging due to overlapping clinical features, anatomical complexity and variation in disease presentation across the female life course. In clinical practice, vulvar symptoms are frequently encountered within gynaecology settings, while many underlying conditions fall within the domain of dermatology. This interdisciplinary overlap may contribute to diagnostic uncertainty and delayed recognition of dermatological disease affecting the vulva.

Common symptoms such as vulvar dryness, irritation, pruritus and dyspareunia are frequently reported among women attending gynaecology clinics. Service evaluation data have demonstrated that such symptoms are highly prevalent in routine outpatient practice and may reflect underlying dermatological pathology rather than exclusively gynaecological conditions [1]. These observations highlight the importance of integrating dermatological perspectives into the evaluation of vulvovaginal symptoms.

Diagnostic challenges are further illustrated by uncommon dermatological presentations occurring during hormonally dynamic states. Inflammatory skin disorders presenting during pregnancy may initially be interpreted as pregnancy-specific dermatoses, potentially delaying accurate diagnosis and appropriate management [2].

Emerging literature has emphasised that vulvar and perineal dermatoses display variable patterns across the female life course. Hormonal transitions influence epithelial barrier integrity, mucosal immunity and local microbial ecology, all of which may

shape disease susceptibility and clinical expression [3]. These observations support the concept that endocrine context plays a fundamental role in vulvar disease expression and suggest the utility of a structured conceptual model, here termed the life-stage hormonal vulnerability framework.

Many vulvar conditions demonstrate temporal associations with hormonal transitions. Hypo-oestrogenic states during peri- and postmenopause are associated with epithelial thinning and altered barrier function, while puberty, reproductive years and pregnancy involve dynamic endocrine fluctuations that influence mucosal immunity and microbial balance. Recognising these patterns suggests that hormonal context represents an important yet under-recognised dimension in understanding vulvar disease.

### Conceptual Framework

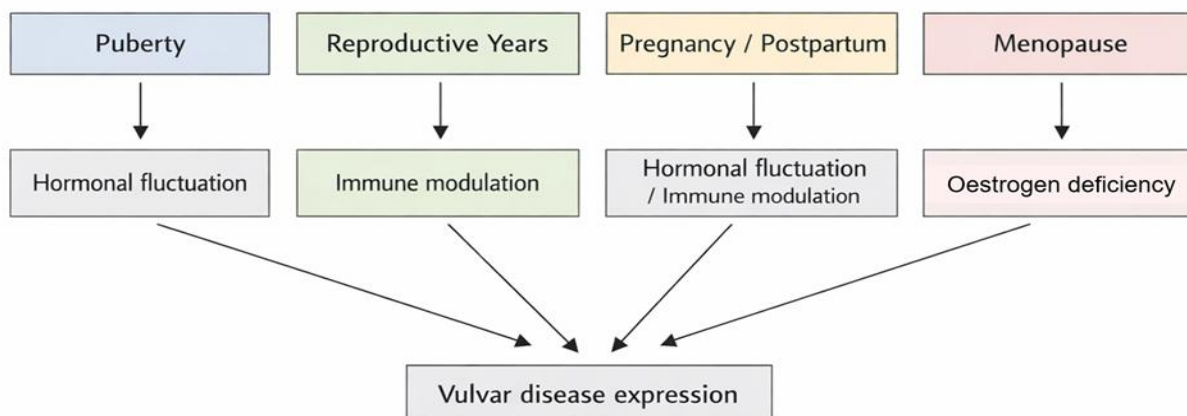
A life-stage conceptual framework for vulvar dermatoses based on hormonal vulnerability patterns may provide a useful perspective for interpreting these observations. Such an approach integrates endocrine, immunological and microbial influences that interact to shape vulvar disease susceptibility across different stages of the female life course [4-6]. To our knowledge, a formal life-stage classification of vulvar dermatoses incorporating hormonal vulnerability patterns has not previously been proposed.

Within this framework, four overlapping conceptual categories can be considered. The first category comprises oestrogen-deficiency-associated disorders, which tend to occur in peri- and postmenopausal individuals. Reduced oestrogen levels contribute to epithelial thinning, impaired barrier integrity and altered mucosal immune responses, creating a biological environment that may predispose to inflammatory dermatoses affecting vulvar tissue [3]. A second category includes hormonal-fluctuation-associated conditions, which may arise during periods characterised by dynamic endocrine variation such as puberty, the reproductive years and pregnancy. Hormonal changes during these stages influence mucosal immunity and the composition of the vulvovaginal microbiome, potentially contributing to episodic or recurrent disease expression [3].

The third category encompasses immune-dominant inflammatory dermatoses, including lichenoid and erosive inflammatory disorders. These conditions are primarily driven by immune dysregulation, although hormonal context may modulate disease severity, mucosal resilience and symptom expression [4,5].

Finally, microbiome-associated conditions reflect the dynamic interaction between endocrine environment and microbial ecology. Hormonal transitions influence vaginal microbiota composition and mucosal defence mechanisms, which may contribute to susceptibility to inflammatory or infectious vulvar disease [6].

These relationships are summarised in Fig. 1, which illustrates the progression from life-stage transitions to hormonal and immunological influences, ultimately converging on vulvar disease expression. The model highlights how systemic endocrine changes interact with mucocutaneous immunity and microbial factors to shape the clinical manifestation of vulvar dermatoses.



**Figure 1:** Life-course hormonal vulnerability model of vulvar dermatoses.

The figure illustrates the proposed conceptual model linking key female life stages (Puberty, Reproductive years, Pregnancy/Postpartum and Menopause) to their associated hormonal and immunological contexts (Hormonal fluctuation, Immune modulation and Oestrogen deficiency). Arrows indicate the progression from life-stage transitions to biological influences affecting mucocutaneous immunity and epithelial barrier integrity, ultimately converging on vulvar disease expression. This schematic represents the proposed life-stage hormonal vulnerability framework for vulvar dermatoses, highlighting how endocrine transitions may shape susceptibility to inflammatory and infectious vulvar conditions across the female life course [3,6].

### **Clinical and Research Implications**

Considering hormonal context during the clinical evaluation of vulvar dermatoses may enhance diagnostic reasoning and facilitate collaboration between dermatology and gynaecology. Incorporating life-stage factors into clinical assessment encourages clinicians to interpret vulvar symptoms within broader physiological processes rather than viewing them solely through disease-specific frameworks.

Such an approach may also help explain why symptoms commonly encountered in gynaecology clinics, including vulvar dryness, irritation and dyspareunia, may reflect underlying dermatological disease processes rather than isolated gynaecological pathology [1].

From a research perspective, this conceptual framework provides a structured hypothesis for investigating how hormonal transitions influence mucocutaneous immunity, epithelial barrier integrity and microbial ecology across the female life course. Integrative analyses of vulvar dermatoses across different hormonal stages have highlighted the importance of these interactions and support further investigation into endocrine influences on disease expression [3, 6].

Future studies exploring these relationships may help clarify pathophysiological mechanisms and inform targeted therapeutic strategies.

### **Conclusion**

Hormonal transitions represent a fundamental biological process shaping female mucocutaneous physiology. A life-stage classification framework based on hormonal vulnerability patterns offers a novel perspective for understanding vulvar dermatoses, integrating endocrine, immunological and microbial influences on disease expression. Recognising these patterns may enhance diagnostic approaches, strengthen collaboration between dermatology and gynaecology and stimulate further research into the mechanisms underlying vulvar disease. This framework may also assist clinicians in contextualising vulvar symptoms within the hormonal stage of the patient's life.

### **Conflict of Interest**

The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

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### **Data Availability Statement**

Not applicable.

### **Ethical Statement**

The project did not meet the definition of human subject research under the purview of the IRB according to federal regulations and therefore was exempt.

### Informed Consent Statement

Informed consent was taken for this study.

### Authors' Contributions

All authors contributed equally to this paper.

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