BG Pulse Journal USA
ISSN:1947-2536 http://www.bgpulseusa.com/index.php/bg

PREVENTION OF SKIN EPITHELIAL BARRIER DAMAGE CAUSED BY HOUSEHOLD CHEMICALS USING PHYTOPRODUCTS: HYGIENIC RATIONALE AND PREVENTIVE POTENTIAL: A REVIEW

Araboyev Shoxruxbek Adxamjon o'g'li

Phytoproducts for Preventing Skin Barrier Damage Caused by Household Chemicals

Doi: https://doi.org/10.5281/zenodo.24269975

Abstract: Household chemicals such as detergents, dish-washing liquids and cleaning agents are in daily contact with the skin of the hands, yet their cumulative effect on the epidermal barrier is rarely addressed in hygienic practice. This paper reviews the structure and function of the skin barrier, the mechanisms by which surfactants, alkaline products and repeated water contact damage it, and the preventive options available, with particular attention to plant-derived products (phytoproducts). Evidence for the barrier-restoring, antioxidant and anti-inflammatory activity of phytoproducts is promising but heterogeneous, and well-controlled human studies are limited. The paper therefore outlines the methodological requirements for a hygienic evaluation: validated skin-barrier measurements, a vehicle-only control and preliminary safety testing. Practical hygienic recommendations and directions for further research are discussed.

Keywords: Skin barrier, Household chemicals, Irritant contact dermatitis, Phytoproducts, Transepidermal water loss, Skin pH, Hygienic prevention.

1. INTRODUCTION

The skin is the first line of defense between the body and its environment, and the outer layer of the epidermis, the stratum corneum, provides most of this barrier function. In everyday life the hands are exposed repeatedly to household chemicals: dish-washing liquids, laundry and cleaning products, bleach-containing agents and soaps. Frequent contact with water combined with surfactants and alkaline substances can gradually impair the barrier and lead to dryness, redness, itching and irritant contact dermatitis. Because such exposure is common, long-term and often unrecognized, it is a legitimate subject of hygienic study and prevention. The main domains of damage are summarized below.

DOMAINS OF HOUSEHOLD CHEMICAL SKIN DAMAGE

1. Structural: loss of stratum corneum lipids and natural moisturizing factors
2. Physicochemical: shift of skin pH, increased transepidermal water loss
3. Inflammatory: release of mediators, erythema, itching, scaling
4. Behavioral: frequency of contact, missing gloves and after-care

2. THE SKIN BARRIER AND MECHANISMS OF DAMAGE

2.1 Structure and Function of the Epidermal Barrier

The stratum corneum is often described by the "bricks and mortar" model: flattened corneocytes embedded in a lipid matrix rich in ceramides, cholesterol and free fatty acids [1]. This structure

limits water loss from the body and prevents the penetration of irritants and microorganisms. When the lipid matrix is disturbed, transepidermal water loss (TEWL) rises and the skin becomes more permeable and more reactive to subsequent exposure [1, 2].

2.2 Effect of Surfactants, pH and Inflammatory Mediators

Surfactants clean by solubilizing oils and dirt, but the same property allows them to remove skin lipids and proteins and to swell the stratum corneum; milder cleansing formulations cause less disruption [3]. Skin surface pH is slightly acidic, and this acidity supports enzymes that maintain barrier lipids and the skin's antimicrobial defense, so alkaline products delay barrier recovery [4]. Tissue damage is accompanied by the release of local mediators such as prostaglandins and histamine, which regulate inflammatory and protective responses in epithelial tissues [5].

3. PREVENTIVE APPROACHES AND THE ROLE OF PHYTOPRODUCTS

3.1 Evidence for Plant-Derived Products

Plant extracts have been widely investigated for skin repair and inflammation. Reviews of phytomedicine in skin wound healing describe antioxidant, anti-inflammatory and epithelialization-promoting activity of many plant preparations, but note that the evidence base consists largely of experimental and small clinical studies of variable quality [6]. Regular use of emollients and moisturizers is itself known to improve dry-skin barrier disorders [7]. Any phytoproduct must therefore be compared with a vehicle-only control, since the base alone may produce part of the observed effect.

Preventive Measure	Rationale	Limitation	Study Requirement
Mild, pH-appropriate cleansing	Less lipid removal and barrier disruption [3, 4]	Household products vary widely	Record product type; measure skin pH
Leave-on emollient after contact	Improves hydration and barrier function [7]	Vehicle alone has an effect	Vehicle-only control group
Leave-on phytoproduct	Antioxidant and anti-inflammatory activity [6]	Heterogeneous human evidence	Randomized, controlled design; patch test
Reduced contact and protective gloves	Lowers cumulative exposure	Inconsistent use at home	Record exposure frequency and duration

3.2 Hygienic Assessment of Effectiveness

A hygienic evaluation should combine objective and subjective measures: TEWL and skin hydration (corneometry) for barrier function, skin surface pH, visual scoring of erythema and

scaling, and a standardized questionnaire on exposure and symptoms. The study population should consist of adults with frequent household chemical contact, divided into groups using the phytoproduct, the vehicle-only base, and standard care. A preliminary patch test is needed to exclude sensitization to the plant components. Measurements should be repeated over several weeks to show dynamics rather than a single time point.

4. HYGIENIC EDUCATION AND FORMATION OF HABITS

Hygienic skills, including skin care, are formed early and persist if they are practiced repeatedly in the family and educational environment [8]. Preventive programs should therefore teach safe handling of household chemicals, glove use, thorough rinsing and drying, and regular after-care, rather than relying only on a protective product.

5. CONCLUSION

Household chemicals can impair the skin barrier through lipid loss, pH changes and inflammation, and this is a preventable problem. Phytoproducts are a promising preventive option, but their effectiveness must be demonstrated in controlled hygienic studies with objective barrier measurements, a vehicle control and safety testing. Combined with hygienic education, such evidence can support practical recommendations for the population.

REFERENCES

1. Proksch, E., Brandner, J. M., & Jensen, J. M. (2008). The skin: an indispensable barrier. Experimental Dermatology, 17(12), 1063–1072.
2. Elias, P. M. (2008). Skin barrier function. Current Allergy and Asthma Reports, 8(4), 299–305.
3. Ananthapadmanabhan, K. P., Moore, D. J., Subramanyan, K., Misra, M., & Meyer, F. (2004). Cleansing without compromise: the impact of cleansers on the skin barrier and the technology of mild cleansing. Dermatologic Therapy, 17(Suppl 1), 16–25.
4. Ali, S. M., & Yosipovitch, G. (2013). Skin pH: from basic science to basic skin care. Acta Dermato-Venereologica, 93(3), 261–267.
5. Adxamjon o'g'li A. S. PROSTAGLANDINLAR VA GISTAMIN O'ZARO TA'SIRI: OSHQOZON SHILLIQ QAVATI FIZIOLOGIYASIDA ULARNING ROLI // SHOKH LIBRARY. – 2025. – Vol. 1. – No. 10.
6. Pazyar, N., Yaghoobi, R., Rafiee, E., Mehrabian, A., & Feily, A. (2014). Skin wound healing and phytomedicine: a review. Skin Pharmacology and Physiology, 27(6), 303–310.
7. Lodén, M. (2003). Role of topical emollients and moisturizers in the treatment of dry skin barrier disorders. American Journal of Clinical Dermatology, 4(11), 771–788.
8. Shokhrukhbek, Araboyev. "CULTURAL AND HYGIENE OF PRESCHOOL CHILDREN FORMATION OF QUALIFICATIONS." International journal of scientific researchers (IJSR) INDEXING 5.1 (2024): 221-222.