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Skin Diseases in Beekeepers: Causes and Risk Factors

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Abstract

Beekeeping is a labor-intensive profession that necessitates constant exposure to outdoor environmental conditions. As a result, beekeepers are frequently subjected to various physical and chemical agents, which can lead to dermatological conditions such as eczema. Eczema is a chronic inflammatory skin disorder characterized by redness, itching, dryness, and blister formation. One of the primary occupational risk factors for eczema in beekeepers is prolonged contact with bee products—including honey, propolis, and beeswax—which can trigger allergic reactions. Despite its potent antibacterial properties, propolis is a well-known contact allergen that may cause allergic contact dermatitis in sensitized individuals. Working conditions also significantly contribute to eczema development. Beekeepers often wear boots, gloves, and protective suits for extended periods, leading to sweating and sustained skin moisture, which can aggravate irritation and inflammation. Prolonged exposure to heat and sunlight may further weaken the skin barrier and increase sensitivity. Additionally, inadequate hygiene or improper sanitation practices, along with frequent use of chemical repellents and disinfectants to prevent bee stings, may exacerbate skin damage. Excessive use of soaps and detergents can deplete the skin's natural oils, increasing dryness and susceptibility to eczema. This paper discusses the etiology, risk factors, clinical symptoms, and diagnostic approaches for occupational eczema among beekeepers. Furthermore, it outlines preventive strategies such as proper use of personal protective equipment, skin care routines, and treatment options. Recommendations for minimizing occupational skin diseases in the beekeeping sector are also provided.

Keywords: *Beekeeping, propolis, allergic contact dermatitis, occupational health, eczema*

Introduction

Due to its ecological diversity and socio-economic structure, beekeeping is practiced in almost every region of Turkey. Although approximately 75% of the world's nectariferous plants grow in Turkey, only about 10% of this potential is currently utilized (Doğanay, 2007). Turkey ranks second globally in honey production with about 7% of the total share and third in terms of colony numbers (Güneşdoğdu & Akyol, 2019). The country's favorable climate and rich natural flora offer a suitable environment for beekeeping (Güneşdoğdu & Şekeroğlu, 2020).
However, beekeeping involves significant occupational hazards due to both physical and chemical exposure. Beekeepers are at higher risk of developing dermatological diseases, particularly eczema and contact dermatitis, due to frequent contact with bee products and the chemicals used in pest management.

Dermatological Risk Factors in Beekeeping

Propolis, a natural compound collected by bees from various plants, is a common allergen that may cause contact sensitivity (Bunney, 1986). The reported prevalence of allergic reactions to propolis ranges from 1.2% to 6.6% (Münstedt & Kalder, 2009). Geographic variation in its chemical composition complicates the evaluation of contact allergies (Nyman et al., 2020). Beekeepers also use acaricides containing formic acid, oxalic acid, and essential oils such as thyme, lavender, and bay leaf to control parasitic mites. These substances are known to be irritant and allergenic (Qayoom et al., 2024).
Dermatitis is a common inflammatory skin disorder caused by disruption of the skin barrier due to chemical or physical agents (Uter et al., 1998). Pathophysiologically, it is classified into irritant contact dermatitis (ICD) and allergic contact dermatitis (ACD). ACD arises from an acquired immune response to specific antigens, while ICD results from activation of the innate immune system by irritant substances (Krasteva et al., 1999a).
Frequent use of soap and disinfectants weakens the skin barrier, potentially leading to hand eczema. Symptoms include itching, dryness, fissures, and bleeding (Singh et al., 2020). If left untreated, eczema may worsen over time and negatively affect the patient's quality of life (Agner et al., 2008; Techasatian et al., 2021).

Prevalence and Prevention of Eczema in Beekeepers

Due to regular exposure to substances like propolis, beeswax, bee venom, and acaricides, beekeepers often develop compromised skin barriers. While protective equipment such as gloves and masks can reduce contact with irritants, prolonged use may cause sweating and further irritation.

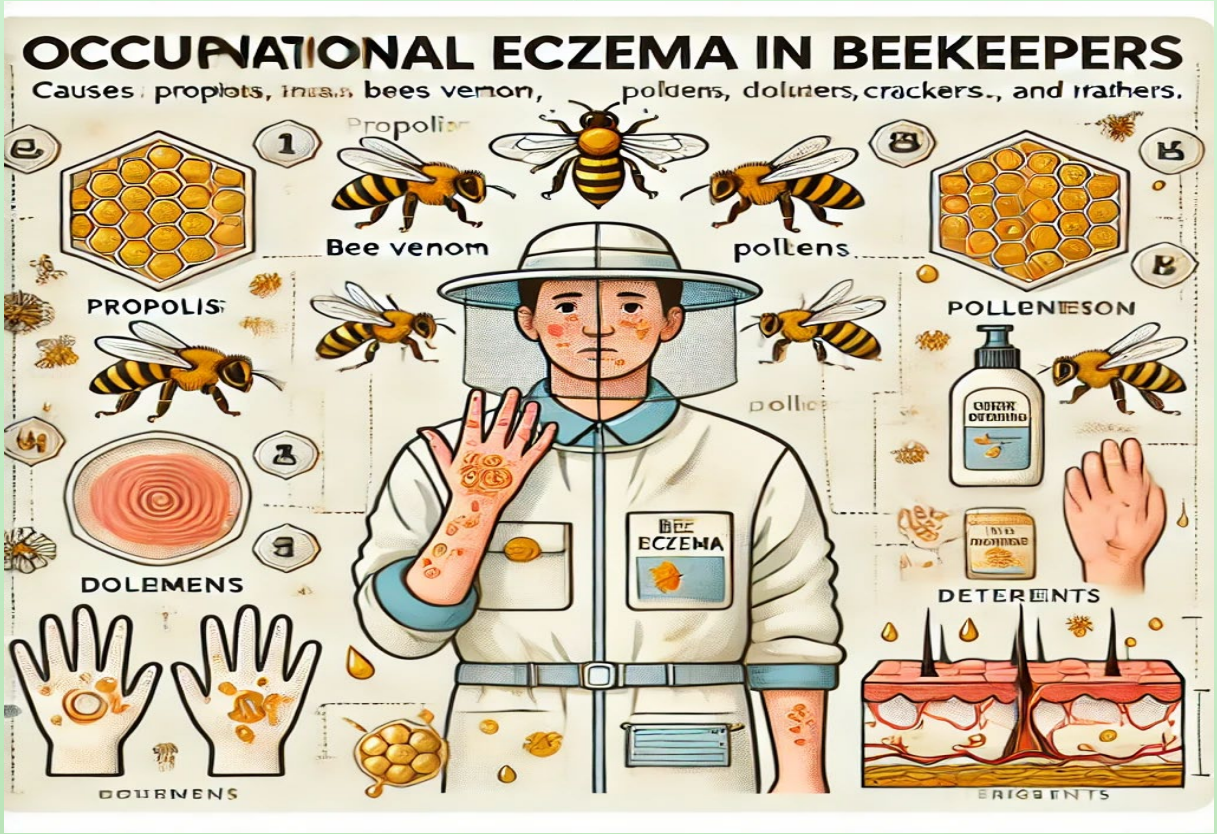

Figure 1. ChatGPT-Assisted Scientific Illustration: Pathogenesis of Occupational Eczema and Associated Skin Lesions in Beekeepers.

Living conditions also influence eczema risk. Beekeepers in rural areas may face limited access to hygiene facilities, which hinders proper skin care. Inadequate laundering of clothing may contribute to bacterial or fungal infections, worsening eczema.

Heat and perspiration are additional risk factors. Sweat disrupts the skin barrier, promoting irritation and microbial growth. Therefore, it is recommended that beekeepers wear breathable cotton clothing, cleanse their skin after sweating, and wash garments regularly. A visual representation of eczema lesions and etiological factors generated by an AI tool (ChatGPT) is provided in Figure 1.

Oosterhaven et al. (2019) reported a one-year prevalence of dermatitis among Dutch beekeepers at 13.2%, with a lifetime prevalence of 20.5%. The development of allergic sensitivity to propolis typically requires about 9.5 years of occupational exposure (Münstedt & Kalder, 2009). Illg and Sanokowska (1976) documented a 4.04% prevalence of propolis-induced allergy in Polish beekeepers. Among the 26 allergens identified in propolis, the most significant is LB-1, which contains three pentenyl caffeate esters derived from poplar buds. These include 3-methyl-2-butenyl caffeate (54.2%), 3-methyl-3-butenyl caffeate (28.3%), and 2-methyl-2-butenyl caffeate (4.3%), as well as phenethyl caffeate (7.9%), caffeic acid (1.3%), and benzyl caffeate (1.0%). Other compounds such as caffeic acid phenethyl ester (CAPE), benzyl salicylate, and benzyl cinnamate also contribute to contact dermatitis (Basista-Sołtys, 2013).

To mitigate the risk of eczema and related skin conditions, beekeepers should wear appropriate protective clothing, adhere to hygiene practices, and minimize contact with irritant substances. Regular skin care and medical checkups are also advised. Figure 2 illustrates eczema-related lesions on the hands, feet, knees, and scalp of beekeepers.

Conclusion and Recommendations

Etiological factors of eczema:

1. Genetic predisposition, immune responses, and environmental conditions.
2. Continuous exposure to bee products and external elements places beekeepers in a high-risk category.

Preventive measures:

1. Use protective gloves and suitable clothing.
2. Maintain regular skin care using non-irritating moisturizers.
3. Avoid contact with harsh chemicals and detergents.
4. Prefer dermatologically appropriate products over regular soaps.

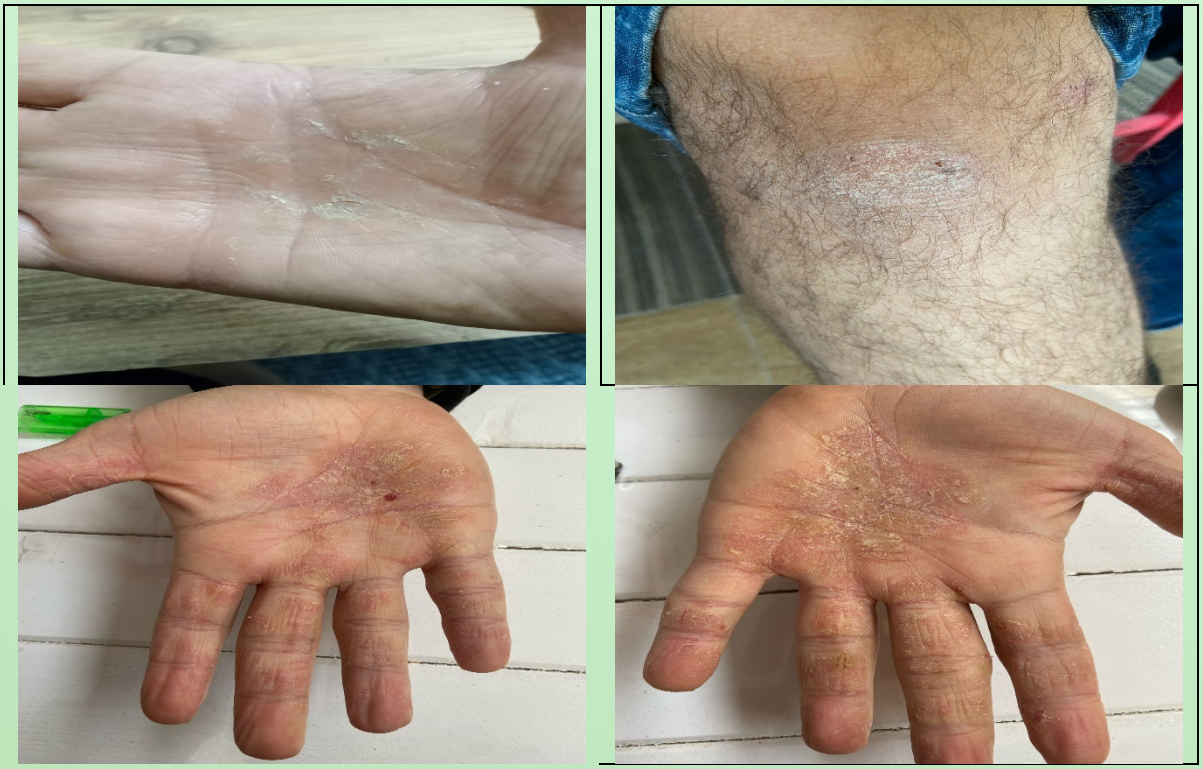

Figure 2. Clinical Manifestations of Occupational Eczema in Beekeepers Across Different Body Regions

Recommendations for beekeepers:

1. Implement measures to reduce allergen exposure in the workplace.
2. Choose latex-free, breathable gloves.
3. Keep headgear and underarm areas clean, as they accumulate sweat.
4. If boots are worn for foot protection, they should be cleaned regularly.
5. Choose apiary locations near water sources and launder clothing frequently.
6. Prioritize personal hygiene.
7. Seek dermatological care at the early signs of eczema.
8. Suggestions for future research:
9. Conduct large-scale epidemiological studies on the prevalence of eczema in beekeepers.
10. Examine the dermatological effects of bee products in detail.
11. Develop effective and natural preventive solutions for eczema.

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