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ANTIBIOTIC RESISTANCE OF CUTIBACTERIUM ACNES ISOLATED FROM PATIENTS WITH ACNE VULGARIS: A SYSTEMATIC REVIEW AND META-ANALYSIS

Мирвасидов М. М.
Алиев А. Ш
1-я кафедра дерматовенерологии и косметологии
Ташкентский государственный медицинский университет

Abstract
Cutibacterium acnes (C. acnes) plays a key role in the pathogenesis of acne. Studies on antibiotic resistance of this microorganism are being conducted in many countries, but systematic reviews and meta-analyses on this topic are still lacking. The aim of this study was to systematically assess the level of resistance of C. acnes to various antibiotics in order to form rational approaches to antibiotic therapy of acne.

Keywords: Cutibacterium acnes; acne vulgaris; antibiotic resistance; meta-analysis; prevalence; pharmacovigilance.

Introduction

Cutibacterium acnes (C. acnes) plays a key role in the pathogenesis of acne. Studies on antibiotic resistance of this microorganism are being conducted in many countries, but systematic reviews and meta-analyses on this topic are still lacking. The aim of this study was to systematically assess the level of resistance of C. acnes to various antibiotics in order to form rational approaches to antibiotic therapy of acne.

Materials and methods

A systematic search of relevant publications was carried out in the databases PubMed, Cochrane Library, EMBASE, Web of Science, China National Knowledge Infrastructure (CNKI) and Wanfang Data for the period from January 10, 2005 to May 10, 2025. From the selected studies, data were extracted on the frequency of resistance of C. acnes isolates to antibiotics of various groups — **quinolones, macrolides, tetracyclines** and others. The overall rate of resistance was calculated using the R software package.

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Outcomes

A total of 7996 publications were identified, of which 24 studies met the inclusion criteria. The analysis included data on 1780 isolates of C. acnes. The levels of resilience (95% CI) were distributed as follows:

• Roxithromycin – 46% (37.5–54.5)• Clarithromycin – 45.5% (25.5–65.5)• Azithromycin – 42.5% (26.5–58.5)• Erythromycin – 30.5% (24.5–36.5)• Clindamycin – 22.38% (14.69–32.56)• Levofloxacin – 7.8% (3.1–12.5)

• Doxycycline – 3.85% (1.1–6.6)• Tetracycline – 2.3% (0.6–4.0)

• Co-trimoxazole (TMP-SMX) – 1.47% (0.00–85.72)• Chloramphenicol – 0.28% (0.04–1.94)• Minocycline – 0.22% (0.03–1.89)

Subgroup analyses showed that levels of resistance to macrolides and clindamycin are significantly higher in Asia than in other regions. In addition, resistance to levofloxacin, erythromycin, and clindamycin showed an upward trend over time ($p < 0.05$).

Discussion

The high rates of C. acnes resistance to macrolides and lincosamides (up to 75% for clarithromycin in China) are probably due to the excessive and prolonged use of antibiotics in the treatment of acne. At the same time, the level of resistance to tetracyclines remains low at 3.85% for doxycycline, which supports the usefulness of maintaining tetracyclines as first-line drugs in the treatment of acne vulgaris. The revealed increase in resistance to levofloxacin, erythromycin, and clindamycin emphasizes the need for rational and limited use of antibiotics in dermatological practice.

Restrictions

The main limitations of the study are the heterogeneity of the included works, differences in sensitivity testing methods, uneven geographical distribution of data, as well as the possibility of publication bias.

Conclusion

In a number of regions of the world, especially in Asia, high levels of antibiotic resistance to C. acnes have been noted, mainly to macrolides and clindamycin. Low resistance to tetracyclines allows them to maintain their status as the main first-line antibiotics for the treatment of acne. Increasing rates of resistance to certain groups of antibiotics require increased antimicrobial surveillance and a revision of antibiotic

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treatment regimens for acne, with an emphasis on limiting unnecessary antibiotic prescribing and the use of alternative therapeutic strategies.

Conflict of Interest Statement

The authors declare that there are no commercial or financial relations that could be interpreted as a potential conflict of interest.

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