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Ocular Permeation of Topical Tazocin and Its Effectiveness in the Treatment of Pseudomonas aeruginosa Induced Keratitis in Rabbits

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Abstract

Purpose:Pseudomonas aeruginosa is the most common causative organism for contact lens-associated corneal ulcer and is commonly treated with fluoroquinolones. With the emergence of resistant strains, it is important to investigate alternative therapies. Despite well-established efficacy of tazocin against systemic Pseudomonas infections, its topical use for the treatment of Pseudomonas keratitis has not been described, hence this study was aimed to find the ocular permeation of Tazocin and its efficacy in treating keratitis in rabbit eyes. Methods: We investigated the ocular permeation of topical tazocin after single drop application in normal rabbit eyes by estimating piperacillin and tazobactam concentrations in cornea, aqueous, and vitreous using a validated LC-MS/MS method. Furthermore, we determined the efficacy of repeated dose administration of tazocin against experimentally induced P. aeruginosa keratitis in rabbits in comparison to moxifloxacin. To determine the efficacy, clinical examination, histopathological examination, and estimation of bacterial load and inflammatory cytokines in cornea were done. Results: Significant corneal concentration of piperacillin and tazobactam was detected in normal rabbit corneas after single dose treatment with tazocin. In rabbits with Pseudomonas-induced keratitis, topical tazocin caused significant clinical and histopathological improvement. This improvement was associated with reduction in corneal bacterial load and inflammatory cytokines. Compared to moxifloxacin 0.5%, tazocin treated group showed greater clinical response which was associated with higher interleukin (IL)-1, lower tumor necrosis factor (TNF)-, a comparable level of IL-8, greater reduction in corneal bacterial load, and lesser inflammatory cell infiltration. Conclusion: Tazocin showed good ocular penetration and was effective in treatment of Pseudomonas induced keratitis in rabbits.

Keywords

Author Keywords: Pseudomonas aeruginosa; tazocin; bacterial keratitis; contact lens induced ulcer

KeyWords Plus: CORNEAL EPITHELIAL-CELLS; GENE-EXPRESSION; BACTERIAL KERATITIS; MICROBIAL KERATITIS; RISK-FACTORS; PIPERACILLIN/TAZOBACTAM; INFECTION; ENDOPHTHALMITIS; EYE; INFLAMMATION

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