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Clinical effectiveness of platelet-rich plasma and platelet-related products for corneal ulcers: a systematic review and meta-analysis

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ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Data extraction.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 24 September 2024 and was last updated on 24 September 2024.

INTRODUCTION

Review question / Objective The objective of this review is to systematically review and analyze the clinical effectiveness of platelet-rich plasma (PRP) and platelet-related products (e.g., plasma rich in growth factors (PRGF), platelet lysate) in the treatment of corneal ulcers. The review seeks to synthesize the available evidence on their impact on visual acuity, corneal healing, and other clinical outcomes.

Rationale Corneal ulcers pose a significant therapeutic challenge, particularly when conservative treatments fail. Platelet-rich plasma (PRP) and related products have been proposed as potential therapies due to their biologically active properties, such as growth factor concentration that promotes healing. However, a comprehensive evaluation of their clinical effectiveness is lacking, necessitating this systematic review and meta-analysis.

Condition being studied This review focuses on corneal ulcers, which are characterized by defects in the corneal epithelium involving the underlying stroma. Causes include infections (bacterial, fungal, viral, parasitic), trauma, dry eye syndrome, or other conditions. These ulcers may lead to serious complications if left untreated, including scarring and permanent vision loss.

METHODS

Search strategy The search strategy included terms related to "corneal ulcers," "platelet-rich plasma," " plasma rich in growth factors," and "platelet lysate." The databases used for the review were PubMed, Embase, and the Cochrane Central Register of Controlled Trials (CENTRAL).

Participant or population The review focuses on patients diagnosed with corneal ulcers of varying etiology, including infections, trauma, or other conditions, and may be refractory to conventional treatments.

Intervention The interventions of interest are platelet-rich plasma (PRP) and platelet-related products such as plasma rich in growth factors (PRGF) and platelet lysate. These are used as treatment options to enhance corneal healing and improve clinical outcomes in corneal ulcer management.

Comparator This review is focused on observational studies, so formal comparators may not always be present. Studies without a comparator but reporting before-and-after outcomes will also be included.

Study designs to be included The review includes observational studies, both prospective and retrospective.

Eligibility criteria Studies focusing on platelet-rich plasma (PRP) or platelet-related products for treating corneal ulcers and reporting relevant clinical outcomes were considered for inclusion. In addition to meeting the PICOS criteria, studies had to be published in English and report outcomes related to visual acuity, corneal defect size, healing time, symptoms, adverse effects, intraocular pressure (IOP), or other clinical outcomes. We excluded case reports with fewer than three participants, meeting abstracts, and studies involving combination therapies beyond PRP or platelet-related products.

Information sources The information sources include PubMed, Embase, and the Cochrane Central Register of Controlled Trials (CENTRAL).

Main outcome(s) The primary outcome of the review is the improvement in Best Corrected Visual Acuity (BCVA).

Additional outcome(s) Additional outcomes include reduction in corneal defect size, healing time, improvement in clinical symptoms, the Ocular Surface Disease Index (OSDI), intraocular pressure (IOP), and the occurrence of adverse effects.

Data management Data management will involve extracting and organizing records in a standardized format. Extracted information will be independently verified by a second reviewer to ensure accuracy, and any discrepancies will be resolved through discussion. Meta-analysis will be conducted using R statistical software.

Quality assessment / Risk of bias analysis The quality of included studies will be assessed using the Risk Of Bias In Non-randomized Studies - of Interventions (ROBINS-I) tool, evaluating bias across several domains including confounding, deviations from intended interventions, missing data, classification of interventions, measurement of outcomes, selection of participants, and selective reporting.

Strategy of data synthesis The data synthesis strategy will involve calculating the weighted mean difference (WMD) and its standard error (SE) using the DerSimonian and Laird method. A random-effects model will be applied due to expected heterogeneity between studies. Statistical heterogeneity will be assessed using the I^2 statistic and the Chi-square test p-value.

Subgroup analysis A subgroup analysis will be conducted to compare the effectiveness of different platelet-related products in different subsets of patients.

Sensitivity analysis Sensitivity analysis will be performed to assess the robustness of the results by excluding studies with high risk of bias or those with extreme heterogeneity.

Language restriction The language is restricted to English.

Country(ies) involved Taiwan.

Keywords Corneal ulcers; ocular surface disease; platelet-rich plasma; plasma rich in growth factors; platelet lysate; visual acuity.

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