ABSTRAK

Pengaruh Injeksi Lisat Platelet Rich Fibrin Manusia pada Mukosa Vagina Hewan Model Tikus dengan Prolaps Organ Panggul : Kajian terhadap Ekspresi Kolagen Tipe I, Kolagen Tipe III dan Matrix Metalloproteinase-I

Akbar Novan Dwi Saputra

Latar Belakang : Prolaps organ panggul (POP) dikaitkan dengan ketidakseimbangan kolagen pada jaringan vagina. Penelitian ini mengeksplorasi penggunaan lisat *Platelet-rich Fibrin* (PRF) manusia, untuk memperkuat matriks ekstraseluler jaringan penyokong panggul pada hewan model tikus dengan POP. Tujuan penelitian ini adalah menilai pengaruh injeksi lisat PRF manusia terhadap ekspresi kolagen tipe I, III, dan matrix metalloproteinase (MMP-1) serta deposisi kolagen.
Metode : Hewan model tikus dengan POP dibuat menggunakan metode ovariektomi bilateral dan simulasi persalinan pervaginam. Tikus dibagi menjadi 5 kelompok yaitu kontrol positif, prosedur sham dan kelompok perlakuan lisat PRF dosis 25/50/75 µl/minggu selama 4 minggu. Ekspresi gen dievaluasi dengan qRT-PCR, ekspresi protein dianalisis dengan imunohistokimia dan deposisi kolagen diukur melalui pewarnaan *Sirius Red*. Analisis statistik menggunakan uji *one-way* ANOVA diikuti *post hoc LSD*, dengan $p<0,05$.
Hasil: Injeksi lisat PRF manusia dosis 50 µL/minggu selama 4 minggu meningkatkan ekspresi kolagen III pada tingkat RNA ($p=0,001$) dan protein ($p=0,01$), serta deposisi kolagen ($p=0,006$). Ekspresi MMP-1 menurun pada tingkat RNA ($p=0,007$) dan protein ($p=0,006$). Tidak didapatkan perbedaan signifikan pada ekspresi kolagen I pada tingkat RNA ($p=0,981$) maupun protein ($p=0,362$).
Kesimpulan: Injeksi lisat PRF manusia dosis 50µl/minggu pada mukosa vagina hewan model tikus dengan POP meningkatkan ekspresi kolagen tipe III dan deposisi kolagen serta menurunkan ekpresi MMP-1, yang berpotensi memperkuat matriks ekstraseluler jaringan penyokong panggul. Namun, tidak didapatkan perbedaan signifikan pada ekspresi kolagen tipe I. Penelitian ini memberikan dasar bukti ilmiah untuk pengembangan lisat PRF manusia dapat digunakan sebagai terapi injeksi intravaginal pada penanganan POP.
Kata kunci : prolaps organ panggul, lisat PRF Manusia, kolagen tipe I, kolagen tipe III, MMP-1, deposisi kolagen

ABSTRACT

Effect of Human Platelet-Rich Fibrin Lysate Injection on the Vaginal Mucosa of a Rat Model with Pelvic Organ Prolapse : Study on the Expression of Collagen Type I and Collagen Type III and Matrix Metalloproteinase-I

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Background: Pelvic organ prolapse (POP) is associated with a collagen imbalance in vaginal tissues. This study explored the use of human platelet-rich fibrin (PRF) lysate to strengthen the extracellular matrix of pelvic support tissue in a rat animal model with POP. The aim was to assess the effect of human PRF lysate injection on collagen type I, III, and matrix metalloproteinase (MMP-1) expression and collagen deposition.
Methods: A rat animal model with POP was created through bilateral ovariectomy and simulated vaginal delivery. Rats were divided into 5 groups: positive control, sham procedure, and PRF lysate treatment groups at a dose of 25/50/75 µl/week for 4 weeks. Gene expression was evaluated by qRT-PCR, protein expression was analysed by immunohistochemistry, and collagen deposition was measured by Sirius Red staining. Statistical analysis used a one-way ANOVA test followed by post hoc LSD,with $p<0.05$.
Results: Injection of human PRF lysate at a dose of 50 µL/week for 4 weeks increased collagen III expression at the RNA ($p = 0.001$) and protein ($p = 0.01$) levels, as well as collagen deposition ($p = 0.006$). MMP-1 expression decreased at the RNA ($p = 0.007$) and protein ($p = 0.006$) levels. There was no significant difference in collagen I expression at the RNA ($p = 0.981$) and protein ($p = 0.362$) levels.
Conclusion: Injection of human PRF lysate at a dose of 50µl/week into the vaginal mucosa of a rat animal model with POP increased type III collagen expression and collagen deposition and decreased MMP-1 expression, potentially strengthening the extracellular matrix of pelvic support tissue. However, there was no significant difference in the expression of type I collagen. This study provides a scientific evidence base for the development of human PRF lysate to be used as an intravaginal injection therapy in POP treatment.
Keywords: pelvic organ prolapse, human PRF lysate, collagen type I, collagen type III, MMP-1, collagen deposition