

## ABSTRAK

### Pengaruh Penambahan *Extracorporeal Shockwave Therapy* terhadap Kadar Matrix Metalloproteinase-13: Studi pada Pasien dengan Osteoarthritis Lutut yang Mendapatkan *Quadriceps Set Exercise*

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**Latar Belakang.** Osteoarthritis (OA) adalah penyakit sendi degeneratif yang mengenai kartilago dan seluruh bagian sendi dan merupakan penyebab disabilitas mayor pada muskuloskeletal dengan kejadian tersering terjadi pada sendi lutut. Progresivitas OA merupakan prediktor disabilitas pada OA. Matrik metalloproteinase (MMP) terutama MMP-13 merupakan biomarker kerusakan kartilago pada OA. Latihan isometrik quadriceps merupakan tatalaksana pada OA yang dapat menurunkan kadar MMP-13. ESWT merupakan modalitas baru yang dapat menurunkan kadar MMP pada OA melalui proses regenerasi sehingga dapat menurunkan kadar MMP-13.

**Tujuan.** Mengetahui pengaruh penambahan ESWT pada pasien OA lutut yang mendapat latihan *quadriceps set* terhadap kadar MMP-13 serum.

**Metode.** Penelitian ini merupakan *randomized controlled trial* pada 28 pasien OA, yang dibagi menjadi kelompok perlakuan (n=15) dan kontrol (n=13). Kedua kelompok mendapatkan latihan *quadriceps set home program* 3 set 10 repetisi setiap hari. Kelompok perlakuan mendapatkan ESWT 0,16 mJ/mm<sup>2</sup>, frekuensi 4 mHz, 4000 *pulse* sedangkan kelompok kontrol mendapatkan *sham* ESWT 1x/minggu. Latihan dan ESWT dilakukan selama 4 minggu dan dilakukan pengukuran kadar MMP-13 serum sebelum dan sesudah intervensi pada kedua kelompok.

**Hasil.** Terdapat perbedaan yang bermakna secara statistik pada rerata kadar MMP- 13 serum sebelum dan sesudah perlakuan pada kedua kelompok (p=0,001 dan p=0,008, berurutan), namun tidak terdapat perbedaan yang bermakna secara statistik pada rerata selisih kadar MMP-13 serum kedua kelompok (p=0,596) dengan penurunan rerata yang lebih tinggi pada kelompok perlakuan dibandingkan kelompok kontrol (-0,63 + 0,53 vs -0,57 + 0,64).

**Kesimpulan.** Tidak terdapat perbedaan bermakna penurunan kadar MMP-13 serum pada pasien OA lutut yang mendapatkan latihan *quadriceps set* dengan penambahan ESWT dibandingkan kelompok yang mendapatkan latihan *quadriceps set* saja.

**Kata kunci:** ESWT, Osteoarthritis, MMP-13, regenerasi

## ABSTRACT

### Effect of Extracorporeal Shockwave Therapy Addition to Matrix Metalloproteinase-13: Study on Patients with Knee Osteoarthritis who Received Quadriceps Set Exercise

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**Background.** Osteoarthritis (OA) is a degenerative joint disease affecting cartilage and all joint's component and is a major cause of musculoskeletal disability that mostly happens at knee. OA progressivity is the disability predictor. Matrix metalloproteinase (MMP) especially MMP-13 is cartilage degradation biomarker in OA. Quadriceps isometric exercise is the recommendation for OA that can reduce MMP-13. ESWT is a new modality that can reduce MMP in OA via regeneration process so the MMP-13 will decrease.

**Objective.** To determine the effect of adding ESWT to knee OA patients who receive quadriceps set exercise to serum MMP-13.

**Method.** This study was a randomized controlled trial in 28 OA patients. All subjects were divided into 2 groups: the treatment group (n=15) and the control group (n=13). Both groups had home program quadriceps set exercise 3 set 10 repetition every day. The treatment group was given ESWT 0,16 mJ/mm<sup>2</sup>, frequency 4 mHz, 4000 pulse, while the control group was given sham ESWT once a week. Both exercise and ESWT were carried out for 4 weeks and serum MMP-13 were measured before and after the intervention in both groups.

**Results.** There was statistically significant difference in the mean serum MMP-13 pre- and post- intervention for both group (p=0,001 dan p=0,008, respectively), but there was no statistically significant reduction of mean difference between both group (p=0,596) with mean reduction higher in the intervention group compared to the control group (-0,63 + 0,53 vs -0,57 + 0,64)

**Conclusion.** There was no significant reduction of serum MMP-13 in knee OA patients who had quadriceps set exercise with addition of ESWT compared to patient who had quadriceps set with addition of *sham* ESWT.

**Keyword:** ESWT, Osteoarthritis, MMP-13, regeneration