RINGKASAN

Efek Stimulasi Medan Elektromagnetik Terhadap Penyembuhan Patah Tulang Tibia Tikus Putih (*Rattus norvegicus*) Pascaovariektomi

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Stimulasi Medan Elektromagnetik merupakan salah satu terapi tambahan pada usaha untuk mempercepat proses penyembuhan patah tulang pada keadaan pascamenopause, akan tetapi prosesnya belum dapat dijelaskan.

Penelitian ini ditujukan untuk membuktikan proses penyembuhan patah tulang pascaovariektomi oleh stimulasi medan elektromagnetik. Ada tiga indikator penyembuhan patah tulang yang dipakai, yaitu : jumlah osteoblas yang mengekspresikan TGFβ, jumlah osteoblas, dan ketebalan kalus.

Dua puluh tikus putih (*Rattus norvegicus)* betina terlebih dahulu dilakukan ovariektomi agar dapat menyerupai keadaan pascaomenopause, satu minggu kemudian dilakukan frakturisasi pada tulang tibia. Dua puluh tikus tersebut kemudian dibagi dalam dua kelompok, sehingga setiap kelompok terdiri dari sepuluh tikus. Kelompok 1 adalah kelompok kontrol yang tidak mendapatkan stimulasi medan elektromagnetik. Kelompok 2 adalah kelompok yang mendapatkan stimulasi medan elektromagnetik selama 6 jam sehari selama 4 minggu. Semua tikus kemudian diperiksa secara histologis dan imonuhistokimia untuk mengetahui jumlah osteoblas yang mengekspresikan TGFβ, jumlah osteoblas, dan tebal kalus.

Dari data hasil penelitian menunjukkan bahwa terdapat peningkatan jumlah osteoblas yang mengekspresikan TGFβ (0,78 ± 0,61 osteblas plp untuk kontrol dan 2,75 ± 0,368 osteblas plp untuk perlakuan), jumlah osteoblas (4,88 ± 1,35 osteblas plp untuk kontrol dan 12,62 ± 1.98 osteblas plp untuk perlakuan) dan tebal kalus (166,5±15,99 untuk kontrol dan 184,0± 57.63 untuk perlakuan). Dari hasil statistika menunjukkan terdapat perbedaan yang bermakna pada jumlah osteoblas yang mengekspresikan TGFβ dan jumlah osteoblas ($p<0,05$)., sedangkan terdapat perbedaan yang tidak bermakna pada tebal kalus pada kelompok 1 dibanding dengan kelompok 2 ($p>0,05$).

Dengan demikian dapat disimpulkan bahwa stimulasi medan elektromagnetik dapat merangsang penyembuhan patah tulang pada keadaan pasacaovariektomi melalui peningkatan jumlah osteoblas yang mengekspresikan TGFβ dan jumlah osteoblas. Pada akhirnya diharapkan stimulasi medan elektromagnetik dapat merangsang penyembuhan patah tulang pada penderita osteoporosis

SUMMARY

The Effect of Electromagnetic Field Stimulation on The Healing of Tibial Fracture of Ovariectomized Rats

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Electromagnetic field stimulation was one of the alternative therapy to promote fracture healing in postmenopause, but the process remain unclear.

This experimental study was performed to know the mechanism how electromagnetic field affects healing process on ovariectomized fractures. There were three indicators for fracture healing: the amount of osteoblast that express Transforming Growth Factor-β, the amount of osteoblat its self and the thickness of callus.

Twenty *Rattus norvergicus* which have been underwent ovariectomized to have post menopause condition, one week afterward fracturized of the tibia was performed. These twenty rats then divided in two group, each contain 10 rats. First Group was control group which do not recieved electromagnetic field stimulation.Second group was recieved electromagnetic stimulation for 6 hours a day for 4 week period. After 4 week all rats was underwent imunohistochemical and histopathological analysis for the amount of osteoblast that express Transforming Growth Factor-β, the amount of osteoblat its self and the thickness of callus.

The number of osteblasts that express Transforming Growth Factor-β in count per visual field were (0,78 ± 0,61 for 1st group and 2,75 ± 0,368 for 2nd ones) and the amount of osteoblat (4,88 ± 1,35 for 1st group and 12,62 ± 1,98 for 2nd ones), the 2nd group were significantly higher then the 1st ones. There was no significantly different in the Callus's thickness between the groups (166,5±15,99 for 1st group and 184,0± 57,63 for 2nd ones)

This experimental study shows that electromagnetic field stimulation can promote healing process in post ovarictomized fracture healing by increasing the number of osteoblast that express Transforming Growth Factor-β, increasing the number of osteblast and callus's thickness. These findings also suggest that electromagnetic field stimulation can promote osteoporotic fracture healing in osteoporotic patients

ABSTRACT

The Effect of Electromagnetic Field Stimulation on The Healing of Tibial Fracture of Ovariectomized Rats

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There were three indicators for fracture healing: the amount of osteoblast that express Transforming Growth Factor-β, the amount of osteoblat its self and the thickness of callus. Electromagnetic field stimulation was one of the alternative therapy to promote fracture healing in postmenopause, but the process remain unclear.

Twenty *Rattus norvergicus* which have been underwent ovariectomized to have post menopause condition, one week afterward fracturized of the tibia was performed. These twenty rats then divided in two group, each contain 10 rats. First Group was control group which do not recieved electromagnetic field stimulation. Second group recieved electromagnetic stimulation for 6 hours a day for 4 week period. After 4 week all rats were underwent imunohistochemical and histopathological analysis for the amount of osteoblast that express Transforming Growth Factor-β, the amount of osteoblat its self and the thickness of callus.

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Keywords : electromagnetic field stimulation, fracture healing, ovariectomy