The Role of serum expression levels of Microrna-21 on Bone Mineral Density in Hypostrogenic Postmenopausal Women with Osteoporosis: study on level of RANKL, OPG, TGF-1, Sclerostin, RANKL/OPG Ratio, and Physical Activity

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Abstrak

Background: MiR-21 is known to play a role in osteoclast proliferation and differentiation, but the role of serum miR-21 expression in osteoporosis remains unclear. Previous research found that serum miR-21 expression was positively correlated with bone mineral density in postmenopausal osteoporosis patients, but other factors involved in postmenopausal osteoporosis still unknown. This study aimed to determine the role of serum miR-21 expression, concentration of RANKL, OPG, TGF-1, sclerostin and serum calcium, RANKL/OPG ratio, and physical activity on bone mineral density of spine in hypoestrogenic postmenopausal women with osteoporosis (PMOP) compared with no osteoporosis (PMNOP), with point of interest on the expression of serum miR-21.
Methods: this study was conducted by comparative cross-sectional design. The subjects were divided into 2 groups of PMOP and PMNOP. We used an absolute quantification real-time PCR method to determine serum miR-21 expressions level.
Results: Median of serum miR-21 expression at the PMOP group was significantly higher compared to PMNOP group (p = 0,001). Serum miR-21 expression, RANKL, RANKL/OPG ratio, and physical activity were significantly correlated with BMD values in the PMOP group. Moderate physical activity was significantly negatively correlated with serum miR-21 expression. We also obtained a linear regression equation BMD = 1,373-0,085*Ln.miR-21-0,176*Log10.RANKL (R2 = 52,5%).
Conclusion: serum miR-21 expression in PMOP was higher compared with PMNOP. Serum miR-21 expression proved to have a negative effect on spinal BMD values in hypoestrogenic postmenopausal women with osteoporosis of 8,5%. Obtained equation of BMD = 1,373-0,085*Ln.miR-21-0,176*Log10.RANKL can explain the value of spinal BMD by 52,5%.
.....Latar belakang: MiR-21 telah diketahui memainkan peranan dalam proliferasi dan diferensiasi osteoklas, tetapi peran ekspresi miR-21 dalam serum terhadap osteoporosis masih belum jelas. Penelitian sebelumnya menemukan bahwa ekspresi miR-21 dalam serum berkorelasi positif dengan kepadatan mineral tulang pasien osteoporosis pascamenopasue, tetapi faktor-faktor lain yang terlibat dalam osteoporosis pascamenopause masih belum diketahui. Penelitian ini bertujuan menentukan peran ekspresi miR-21 dalam serum, kadar RANKL, OPG, TGF-1, sklerostin dan kalsium dalam serum, rasio RANKL/OPG dan aktivitas fisik terhadap kepadatan mineral tulang di tulang belakang pada wanita pascamenopause hipoestrogenik dengan osteoporosis / postmenopausal women with osteoporosis (PMOP) dibandingkan tanpa osteoporosis (PMNOP) dengan titik berat pada ekspresi miR-21 dalam serum.
Metode: penelitian ini dilaksanakan dengan desain potong lintang komparatif. Subjek penelitian dibagi menjadi dua kelompok, yaitu PMOP dan PMNOP. Metode kuantifikasi absolut dengan real-time PCR digunakan untuk menentukan kadar ekspresi miR-21 dalam serum.
Hasil: nilai median ekspresi miR-21 dalam serum pada kelompok PMOP lebih tinggi secara bermakna

dibandingkan dengan kelompok PMNOP (p=0,001). Ekspresi miR-21 dalam serum, RANKL, rasio RANKL/OPG dan aktivitas fisik secara bermakna berkorelasi dengan nilai kepadatan mineral tulang/bone mineral density (BMD) pada kelompok PMOP. Aktivitas fisik sedang berkorelasi negatif secara bermakna dengan ekspresi miR-21 dalam serum. Kami juga mendapatkan persamaan regresi linear BMD=1,373-0,085*Ln.miR-21-0,176*Log10.RANKL (R2=52,5%).
Kesimpulan: Ekspresi miR-21 dalam serum pada PMOP lebih tinggi dibandingkan dengan PMNOP. Ekspresi miR-21 dalam serum terbukti mempunyai efek negatif terhadap nilai kepadatan mineral tulang di tulang belakang (spinal BMD) pada wanita pascamenopause hipoestrogenik dengan tingkat osteoporosis sebesar 8,5%. Persamaan yang didapatkan, yaitu