2.12 Osteoporosis

703040

Determination of procollagen 1 N-terminal peptide and osteopontin in postmenopausal women with vertebral osteoporotic fractures

KA ALI ABDUL BARI, R ALI HAMEDI

Yarmouk Teaching Hospital, Baghdad, Yarmouk City, Iraq

Aims: To evaluate the levels of procollagen 1 N-terminal peptide (P1NP) and osteopontin (OPN) in postmenopausal women with vertebral osteoporotic fractures and compare their levels to control and their contribution to the pathogenesis of osteoporosis.

Methods: Eighty postmenopausal women were included in this study with age range (50–77) years. Subjects were divided into two groups: group A: 44 of them were women with vertebral fractures and group B: 36 of them without vertebral fracture (serve as controls). Lateral X-ray of the thoracic and lumbar spine were taken for all women of both groups which scored according to semi quantitative evaluation of vertebral deformities (kleerkoper method). All women were diagnosed as osteoporosis with DXA (GE machine/Inan DPA – NT version 13.60). All women have no history of severe trauma or falling to the back.

Results: Serum P1NP levels of 44 patients (100%) were in the upper limit of normal values which range from 48.8 to 63.6 ng/mL (mean 55.18 ± 4.45 ng/mL) while all the control group of 36 patients (100%) were in the lower limit which range from 34.5 to 48.9 ng/mL (mean 43.64 ± 3.7 ng/mL). Serum OPN levels of both groups were increased more than normal values (<14.7 ng/mL), the range of group A was between 17.6 and 38.4 ng/mL (mean 25.17 ± 5.41 ng/mL), while the range of group B was between 14.9 and 17 ng/mL (mean 15.9 ± 0.65 ng/mL). Serum P1NP and OPN levels in the postmenopausal women with vertebral osteoporotic fractures were significantly higher than control group (P = 0.001). There is significant increase in OPN level in the postmenopausal women (with vertebral osteoporotic fractures) with age (P = 0.001) but non significant increase in P1NP level with age (P = 0.256).

Conclusion: procollagen 1 N-terminal peptide (P1NP) and osteopontin (OPN) may be used for diagnostic criteria for vertebral osteoporotic fractures or osteoporosis and also play an important role in pathogenesis of osteoporosis.

Key words: Procollagen 1 N-Terminal peptide; Osteopontin; Vertebral fractures and osteoporosis

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703286

Synergistic effect of NSAIDs in bisphosphonate treatment, compared to COX-2 inhibitor

SY LEE1, WT CHUNG1, CW LEE2, H KANG3, SW LEE3

1Dong-A University, 2Baptist Hospital, 3Pusan Medical Center, South Korea

Background: In humans, NSAIDs appear to slow bone loss in postmenopausal treatment by inhibiting synthesis of prostaglandins, known stimulators of osteoclasts/osteoblasts. This suggest a possible clinical application for NSAIDs in prevention of bone loss.

Objective: To investigate the bisphosphonate effects on bone mineral density and T-score in NSAIDs used Patients, compared to COX-2 inhibitor used group.

Methods: Between January 2005 and September 2011, 319 women and 104 men were enrolled. They were osteoarthritis or rheumatoid arthritis (subjects were taken below prednisolone 5 mg) with osteoporosis, treated with NSAIDs or COX-2 inhibitors. The subjects were taken bisphosphonate and bone mineral density was measured by Dual-energy X-ray absorptiometry every 1 year. We observed the difference of bone mineral density, T-score in NSAIDs and COX-2 used groups, spacing 2 years.

Results: The efficacy of bisphosphonate on bone mineral density and T-score was better in NSAIDs group than COX-2 inhibitors group (P < 0.05). Age, sex, body mass index, ESR, CRP, total dose of steroid, disease type, term of used NSAIDs, COX-2, steroid and bisphosphonate were not affected to bone mineral density and T-score in both groups.

Conclusion: In our single center study, we observed the combination bisphosphonate with NSAIDs was better response of osteoporosis treatment than COX-2 inhibitors. Further multicenter studies are needed to confirm our results.


703381

Fracture and osteoporosis rate in patients with different vitamin D level

Y POVOROZHNYUK, N BALATSIA, F KIMOVITSKY, O VDOVINA

Institute of Gerontology NAMS of Ukraine Kyiv, Ukraine

The aim of study was to determine the frequency of secondary hyperparathyroidism, fracture and osteoporosis rate in patients with different vitamin D level. The study involved 670 patients aged 20–85 years old who were hospitalized in the department of age changes of digestive system and endocrine diseases. They were suffered from osteoarthrosis of knee or hip joint (71.1 and 16.2% accordingly), osteochondrosis (55.3% of cases) or postmenopausal osteoporosis (was diagnosed in 20.9% of patients). The average age of the subjects was 55.8 ± 1.3 years. Vitamin D level was assessed with the 25-OH-vitamin D by chemiluminescence method in Elysys 2010. Bone mineral density was measured by DXA.

The vitamin D-deficiency was diagnosed in 81.3% patients and vitamin D-insufficiency in 40.8%. The lowest 25-OH vitamin D level was registered during February and March. Less deficient months were August, September, October and November. Secondary hyperparathyroidism was diagnosed in 11% of examined patients. Significant correlation between 25-OH vitamin D and PTH was found in examined patients (r = 0.13, P < 0.0023). Osteoporosis was determined in 30.2% patients with vitamin D-deficiency, 28.6% – with insufficiency and 20% – with normal level of 25-OH vitamin D. Fracture rate was higher in patients with insufficiency and deficiency of vitamin D (50.3 and 50.8% accordingly versus 25% in patient with normal level of 25-OH vitamin D).

Summary: The low level of 25-OH vitamin D may lead to development of osteoporosis though secondary hyperparathyroidism and increasing the fracture rate.

703482

Bone mineral density in cirrhotic patients in Guilan province (Iran)

H FAYAZI, A SHAFACHI, A HAJIBRASIL, AK ROSHAN, HR RIABI

Guilan University for Medical Sciences, Iran

Background: Osteoporosis is determind with low bone mass.

Objective: Of this study was to evaluate bone mineral density (BMD) in cirrhotic patients in Guilan province (North of Iran).

Material and methods: Osteoporosis was diagnosed by measuring their BMD with Dual energy X-Ray Absorptiometry (DXA). Pregnant women and patients with a previous history of chronic disorders or used drugs that impaired metabolism of bones and patient with lesions which precluded accurate measurement of BMD was excluded. A Z Score < −2 at any site was considered as low BMD. The variables take into consideration were age, sex, BMI, smoking, alcohol abuse, etiology and child score. We used Chi Squared test – fisure – Pearson correlation, Logistic Regression and one way ANOVA for analysis.

Results: From 112 Patients 63 male (56.3%), 49 were Female (43.8%), mean age was 51±11 ± 13.1; forty-two patients (37.5%) had osteoporosis. The most common site of osteoporosis was the lumbar spine (35.7%). We found with Logistic Regression analysis and with effect of variable data that one unit increasing cigarette pack year will increase 51% risk of osteoporosis (P = 0.013) (Odds = 1.3) and increasing one unit of child value will increase two times risk of osteoporosis (P = 0.038) (Odds = 2.2) and decreasing one unit of BMI will increase 35% risk of osteoporosis (P = 0.044) (Odds = 0.65). There was a significant association between osteoporosis and low BMI (P = 0.002), child score (P = 0.002) and pack year of cigarette smoking (P = 0.001). There wasn’t any correlation between Osteoporosis and age, sex and etiology and alcohol abuse.

Conclusion: Osteoporosis is common in cirrhotic patients. It is important to control BMI, child score and smoking in cirrhosis in case of low BMD to prevent of bone disorders in these patients is recommended.

Key words: Cirrhosis; Bone mineral density; Osteoporosis; Dual energy X-ray absorptiome-try

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Expression of circulating advanced glycation end-products and osteopontin in the menopausal women with osteoporosis

D-HO YANG1,2, C-C WEE1,2, Y-W CHENG1

1Institute of Medicine, Chung Shan Medical University, 2Division of Rheumatology/Immunology/Allergy, Department of Internal Medicine, Taichung Armed-Forces General Hospital, 3Division of Rheumatology/Immunology/Allergy, Department of Internal Medicine, Chung Shan Medical University Hospital

Background: Osteoporosis is a skeletal disorder characterized by generalized increasing bone fragility and inducing fracture over hip, spine or wrist. After osteoporotic fractures occur, higher mortality can be found in these patients. Osteoclasts and osteoblasts play a major role in the mechanism of bone resorption and formation. Advanced glycation end-product (AGE) is a non-enzymatic glycation product of protein. The accuracy of the mentioned new technique revealed critical roles of AGEs in the pathogenesis of diabetes, artherosclerosis and renal disorders in aged people. Osteopontin (OPN) is a phosphorylated acidic arginineglycine-serine-containing glycoprotein that was originally identified as a major component of the noncollagenous bone matrix expressed in both osteoblasts and osteoclasts.

Objective: AGCs can accumulate organ and tissue during aging and diabetes. OPN is associated with chronic inflammation, tissue remodeling, fibrosis, and angiogenesis. The purpose of this study was to evaluate circulation AGCs and OPN in the patients with osteoporosis.

Methods: We evaluated plasma AGCs, OPN and bone mass from 82 menopausal women with osteoporosis or osteopenia, 16 young women with osteoporosis and 43 healthy women without osteoporosis or osteopenia.

Results: In osteoporosis or osteopenia group, higher expression of serum AGCs (P = 0.004) and OPN (P = 0.0001) could be found when compared with healthy women. The serum level of OPN had negative correlation in BMD of hip (r = −0.364, P = 0.005) and BMD of neck (r = −0.262, P = 0.049). T-score of hip (r = −0.236, P = 0.03) and T-values (r = 0.388, P < 0.0001). There is a negative correlation between serum AGCs and bone density of lumbar spine (BMD of lumbar, r = −0.249, P = 0.026; T-score of lumbar, r = −0.261, P = 0.021).

Conclusion: The serum of AGCs and OPN could be used to monitor the severity and progression of osteoporosis. OPN was associated with bone resorption and AGCs was associated with the impairment of bone formation. Targeting the AGCs or OPN may represent a novel therapeutic approach for primary or secondary osteoporosis.

703681

Non-invasive optical detection of cathepsin K-mediated fluorescence reveals osteoclast activity in mouse model of osteoporosis

SI CHOI

Korea University College of Medicine, South Korea

Osteoporosis is a skeletal disorder characterized by bone strength to an increased risk of fracture. It becomes an important public health issue, because of the aging population. Osteoporotic imaging is important to identify individuals at risk for fractures to reduce fracture and also monitoring response to treatment. Imaging modalities such as DXA, X-ray and pQCT report bone density. The development of image-based indicators of osteoclast activity will provide for early identification of changes in bone resorption. Individualized treatment was based on early detection of osteoclast activity. Our team developed osteoclast specific nanoparticle (cathepsin K target nanoprobe). Osteoclasts are one of the major source of cathepsin K. Cathepsins are a group of 11 enzymes belonging to the papain family of cysteine proteases. Especially, cathepsin K is known to play an important role in bone resorption in osteoporosis. Therefore, cathepsin K is an attractive target enzyme for both diagnosis and treatment of osteoporosis. Furthermore, in vivo imaging of cathepsin K could be used to detect biologically active sites with progressive osteoporosis and to monitor therapeutic responses to drugs or inhibitors. We investigated a NIRF (near infrared fluorescence) cathepsin K activated by cathepsin K nanoparticles which is shown in live osteoclast activity in mouse models of osteoporosis. In overactivated mice, cathepsin K probe intensity was not decreased even after a time when any sign of structural or anatomic changes could be detected by the histologic and micro-CT analyses. These results may provide valuable meanings for early diagnosis of upregulated resorption and rapid feedback on efficacy of treatment protocols prior to significant bone loss in the patients at risk.

703772

Basic antiinflammatory therapy influence on bone mineral density of patients with rheumatoid arthritis

M KOROlevA1, T RASKINa

Kemerovo State Medical Academy, Russia

Objectives: The purpose of the work is to assess the impact of anti-inflammatory therapy in patients with rheumatoid arthritis on bone mineral density.

Methods: Thirty-two patients were examined (12 [37.5%] men and 20 [62.5%] women) diagnosed with RA according to the criteria of the American College of Rheumatology (1987), with low and moderate level of disease activity on DXA 28.2 ± 1.6. The median age was 52.1 ± 10.77. Duration of disease – 11.3 ± 6.3 years. All the patients were divided into two groups of anti-inflammatory therapy: the first group (n = 19) received methotrexate stable dose of 10–15 mg/week, while the second group (n = 13) received rituximab 1000 mg twice with an interval of 14 days for therapy for methotrexate 10–15 mg/week. In the second group, 2 persons received 3 courses of rituximab, four people – two courses, seven people – one course. All patients over the observation period took calcium supplements and didn’t have antosteoporosis therapy. The bone mineral density was measured by dual energy X-ray absorptiometry (densitometer Faxell XE–45, Nortland, USA). BMD was assessed by the femoral neck and lumbar spine.

Results: It was found that in both groups at baseline, a decrease of indicators of the BMD both in the femoral neck (1.18 ± 0.12 g/cm² and 0.88 ± 0.65 g/cm²) and separated in the lumbar department ([1006.0 ± 16.8 g/cm² and 1013.0 ± 20.3 g/cm²]) and T-score (−2.46 ± 1.74 and −1.52 ± 0.93). The treatment after 2 years in patients treated with methotrexate, the rate of decline in femoral neck, BMD were significantly higher than in patients treated with rituximab – 874.3 ± 11.2 g/cm² and 946.5 ± 16.6 g/cm², P = 0.05. The similar parity was received for T-criteria: reduced T-criteria in 2 years was significantly higher than in the group of patients on rituximab (−2.88 ± 0.17 and −2.19 ± 0.12, P = 0.05). In the lumbar spine statistically significant differences haven’t been received.

Conclusions: RA patients receiving rituximab as a basic therapy statistically significantly slows down the decrease in BMD and T-criteria in the femoral neck.

703782

Comparing effect of osteofos versus alenate on postmenopausal bone mineral density: a randomized double blind controlled equivalence trial

M AGBAJI1, M MEKAN1K2, A KESHTIKAR2, P KHASHAYAR3, S SAQAFI5, S SEN1CH, S HSEIZRKHANI1, N SHAHNI6

1Bone Joint and Connective tissue Research Center, Golestan University of Medical Sciences, Gorgan, Iran, 2Golestan University of Medical Sciences, Gorgan, Iran, 3Epidemiology, Osteoporosis Research Center, Endocrinology and Metabolism Research Institute, Tehran University of Medical Sciences, Tehran, Iran, 4Osteoporosis Research Center, Endocrinology and Metabolism Research Institute, Tehran University of Medical Sciences, Tehran, Iran, 5Golestan research center of gastroenterology and hepatology, Golestan university of medical sciences, Gorgan, Iran, 6Student Research Committee, Golestan University of Medical Sciences, Gorgan, Iran

Objectives: This study aimed to compare the efficacy of the less pricey Iranian version of the medication (Aleana) with the imported version (Osteofos) in postmenopausal women of Golestan Province during 2007–2009.

Methods: One hundred and forty-seven postmenopausal women diagnosed with osteoporosis were enrolled in this double blind study. The demographic data, past medical history, drug history along with the BMD values at the lumbar and femoral regions were recorded at the baseline. Patients were divided into two groups by block randomized method to receive weekly Aleana 70 mg and Osteofos 70 mg. They were then followed by a rheumatologist every 3 months for 18 months. BMD values were re-measured after 18 months with the same device.

Results: The mean age of the patients was 60.2 ± 6.8 years for the first group and 58.6 ± 6.3 for the second group. There was no significant difference between two groups in education level, job, daily diabetes consumption, weekly engagement in physical activity, BMI, postmenopausal years, history of early menopause, past medical history, drug history, and BMD values at lumbar and femoral regions at baseline. There was no significant difference between the increase noted in BMD values of the two groups following the consumption of the study drugs (P = 0.05).

Conclusion: The changes in BMD values observed in this trial showed that Aleana can be a less pricey alternative for osteofos in treating osteoporosis. Key words: Osteoporosis, BMD, Aleana, Osteofos

703848

Bone density and microarchitectures: relationship between hand, peripheral and axial skeletal sites as assessed by HR-pQCT and DXA in rheumatoid arthritis

Y ZEH1, L S TAN1, JF GRIFFITH2, L QIN3, WY HUANG2, TN FONG3, AW RYKOW2, P C LELING3, EK LI2

1Department of Medicine and Therapeutics, The Chinese University of Hong Kong, Shatin, Hong Kong, China, 2Department of Imaging and Interventional Radiology, The Chinese University of Hong Kong, Shatin, Hong Kong, China, 3Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong, Hong Kong, China

Objective: Detailed examination on the relationship between hand and generalized bone loss may provide insight into shared mechanisms between these two types of bone loss in RA. This study aimed to assess the relationship in bone density and microarchitecture between the hand and peripheral and axial sites using high resolution peripheral quantitative computed tomography (HR-pQCT) and dual-energy X-ray absorptiometry (DXA) in patients with rheumatoid arthritis (RA) and to investigate which factors influence these parameters.

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Methods: This was a cross-sectional study of 100 female patients [53.4 ± 9.3 years] with RA. HR-pQCT scans at distal radius and the second metacarpal head were performed to assess cortical and trabecular volumetric bone mineral density (vBMD) and microarchitecture. DXA scans at the hip, lumbar spine and ultradistal radius were performed to assess areal BMD.

Results: There was significant correlation in vBMD and microarchitectural parameters between the second metacarpal head and distal radius (r = 0.201–0.628). Areal BMD at the axial skeleton was moderately associated with vBMD at the peripheral sites (r = 0.354–0.53). Factors related to disease severity, such as duration of disease, and smoking history significantly correlated with vBMD and microarchitecture at distal radius and the second metacarpal head. Factors related to disease activity were more likely to correlate with vBMD and microarchitecture at the second metacarpal head, but not those at distal radius. All the clinical factors remained in the multivariate analyses, except Health Assessment Questionnaire score, were independently associated with vBMD or microarchitecture of either cortical or trabecular bone.

Conclusions: In RA, vBMD and microarchitectural measures of the distal radius had a weak to moderate positive correlation with those at the second metacarpal head. Disease activity tended to affect the metacarpal head while disease severity/chronicity affected both the distal radius and metacarpal head. HR-pQCT has the potential for monitoring peripheral bone loss and bone quality in RA.

Conflict of interest: None declared.

703901

A study on the frequency of osteoporosis based on 39.140: subjects from 35 cities in Turkey

G DILEN1, A MPI2, M UMEN1, O TINOASLAN4

1Istanbul Faculty of Medicine, Turkey, 2Haseki Hospital Istanbul, Turkey, 3Baltaliman? Hospital Istanbul, Turkey, 4Besta! Medical Company Istanbul, Turkey

Background: Osteoporosis (OP) is an important metabolic skeletal disorder in Turkey too. Our interest in and experience on OP go back until 1982.

Objectives: By this study we aimed to determine the frequency of OP and osteoporosis in various age groups in a large population living at sea level or at high levels either below or above 4,000 m altitude by dual energy X-absorptiometry (DXA).

Methods: The study design is a randomized, multicenter and a 12-month study. Although a total of 158,173 subjects were enrolled in the study, only 39,140 (37,332 women, 1,808 men) were fulfilled the eligibility criteria. BMD was measured at spine and femur sites. We used the WHO diagnostic criteria for scoring. The lowest T-score of BMD was accepted for the evaluation.

Results: The prevalence of OP ranged from seven to 15% at fourth decade of life among the subjects. This increased after the menopause especially at lumbar spine but not in men. After the fifth decade, OP at the proximal femur constantly increased both in women and men. After the fifth decade in men and sixth decade in women spinal OP steadily decreased. Most plausibly this can be explained by the increase of degenerative changes in the spine. There were statistically no differences between BMD results of subjects living in North or South. The frequency of OP in subjects living at sea level and high altitude were found to be 35.3% and 38.3% respectively (P < 0.001). These figures at the proximal femur were not significant. Our data revealed that vertebral OP becomes more prominent in subjects living in the spine. There were statistically no differences between BMD results of subjects living in North or South of 40 degree latitude. Interesting findings were found and discussed.

Conclusions: Our data revealed that vertebral OP becomes more prominent in subjects living in the spine. There were statistically no differences between BMD results of subjects living in North or South of 40 degree latitude. Interesting findings were found and discussed.

Conflict of interest: None declared.

References:

Bone mineral density and low level of estrogen in menopausal and postmenopausal females

R SYLJEMAN1, R MELILLA1, R RIERTA1, T ARGEND2, M VIGAN1

1University of Prishtina, 2University of Tirana, Albania

Background: Bone mineral density (BMD) is test that is referred to the bone densitometry. BMD is determined by presence or absence of the bone mass in menopausal and postmenopausal females. Estrogens play a key role in woman’s body. The older a woman, the less estrogen her body produces. This has an impact in the decrease of BMD.

Objectives: To find out the relationship between the BMD and low levels of estrogen at menopausal and postmenopausal females.

Methods: Of total number of 80 females, 39 were postmenopausal, 22 menopausal and 19 premenopausal as control group. Examined females have been interviewed; BMD (g/cm²) has been measured with dual-energy X-ray absorptiometry in Clinic ‘Rheuma’ in Prishtina. Estradiol levels (pg/ml), FSH (IU/L) and LH (IU/L) have been determined with Radioimmunoassay method has been measured in Medical Faculty. Timeframe of research was 2010–2011.

Results: Mean age of menopausal females was 43.47 y.o., menopausal 51.99 y.o., and postmenopausal 62.52. According to our results: Mean of BMD T-score in premenopausal 1.4, menopausal –1.2, and postmenopausal –1.72 respectively. Minimum values of BMD T-score were in premenopausal –2.3, whereas the maximum value was 1.7. Minimum value of BMD T-score in the group of menopausal females was –1.3, and the maximum value was 0.7. In postmenopausal females the minimum value of T-score was –3.6, whereas the maximum value was 2.4. Upon comparison of mean values of T-score, the difference was significant (P < 0.01). Our findings correlate with data from literature [7]. Based on the results we have obtained that osteoporosis is most frequently detected in menopausal females (10 or 45.5%), and in postmenopausal females 22 (56.5%) compared to control group (5.3%). According to the results the average estradiol levels in menopausal females are 516.42 pg/ml, in menopausal females: 295.05 pmol/L and in postmenopausal females: 204.23 pmol/L. Difference between values of estrogen in premenopausal and postmenopausal females (with likelihood 95%) is significant (P < 0.05), whereas the difference with likelihood 99% of estradiol levels in premenopausal and post menopause is significant (P < 0.01). Difference in LH between menopausal and postmenopausal females is significant (P < 0.01). Comparison of FSH between premenopausal and postmenopausal females we have concluded the significant difference (P < 0.01).

Conclusion: In our study among menopausal and postmenopausal females we have detected greater presence of osteopenia and osteoporosis in comparison to menopausal females. Estrogen deficiency continues to play a role in the continual loss of bone mass in females. Therefore prevention, early diagnosing and treatment of osteoporosis is of great importance.


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