D activation have remained unknown. To clarify the clinical usefulness of markers for vitamin D activation, 87 patients in whom serum 25D and 1,25D level was measured were retrospectively reviewed in the present study. Data for 79 patients (33 males and 46 females) were analyzed after exclusion of 8 patients taking vitamin D. The median serum 1,25D/25D ratio was significantly lower in males than in females: 4.1 (IQR: 2.3–5.8) x 10−3 versus 6.8 (3.0–9.8) x 10−3. However, individual levels of 25D and 1,25D were not different in males and females. The major categories of main disorders were endocrine (30.6 %), inflammatory (18.5 %), and bone-related (16.7 %) disorders. The ratios of serum 1,25D/25D had significant negative correlations with femoral dual energy X-ray absorptiometry % young adult mean (DEXA %YAM) (R=-0.35) and lumbar DEXA %YAM (R=-0.32). Significant correlations were found between 1,25D/25D ratio and serum levels of inorganic phosphate (R=-0.34), intact parathyroid hormone (R=0.64) and alkaline phosphatase (R=0.46) in all patients. Of interest, the 1,25D/25D ratio had gender-specific characteristics: the ratio had a significant correlation with age in males (R=0.49), while it had a significant correlation with body mass index (BMI) in females (R=0.34). Collectively, the results revealed that the ratio of serum 1,25D/25D as a marker for activation of vitamin D had relevance to clinical parameters, especially bone turnover, with gender-specific features. It is suggested that the existence of a gender-specific difference of aging males and obese females regarding the activation of vitamin D that is functionally linked to bone metabolism.

Bone and Mineral Metabolism

VITAMIN D, DIABETES AND ENERGY METABOLISM

Circulating Lipocalin-2 Predicts Changes in Lumbar Spine Bone Mineral Density After Parathyroidectomy in Primary Hyperparathyroidism

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Lipocalin-2(LCN2), known as neutrophil gelatinase-associated lipocalin is known to a regulator of bone homeostasis. Upregulation of LCN2 in mice reduces osteoblast differentiation and stimulates the NF-kB pathway, promoting osteoclastogenesis. High serum LCN2 level was associated with elevated risk of fracture-related hospitalization in elderly women. Bone mineral density(BMD) of primary hyperparathyroidism(PHPT) patients tends to recover after parathyroidectomy, but with different extent. Whether circulating LCN2 can predict the extent of BMD recovery after parathyroidectomy in PHPT remains unclear. Clinical data and preoperative serum samples obtained from 35 PHPT patients (women n=30) who underwent parathyroidectomy at Severance hospital, Seoul, Korea between 2016 and 2019 were analyzed. Among 35 patients, 25 patients underwent BMD before surgery and two years after surgery. LCN2 was measured using enzyme-linked immunosorbent assay kit (DLCN20, R&D Systems, USA). Primary outcome was two-year lumbar spine BMD change (%). Mean age of study subjects was 57±13 years. Calcium and parathyroid hormone (PTH) levels restored to normal range after parathyroidectomy in all subjects (calcium [mean 8.7±0.4mg/dL]; PTH [median 33.3], 25.9 to 47.4 pg/mL). Baseline BMD of lumbar spine(LS), femoral neck(FN), and total hip(TH) were 0.776±0.177 g/cm^2, 0.578±0.138 g/cm^2, and 0.695±0.150 g/cm^2, respectively. At 1 year after parathyroidectomy, BMD increased up to 5.5%, 6.1%, and 4.5% at LS, FN, and TH, respectively. At 2 years after parathyroidectomy, BMD increased up to 8.6%, 7.6%, and 7.2% at LS, FN, and TH, respectively. Log-transformed LCN2 at baseline showed positive correlation with LS BMD changes (%) after 2 years (β Coefficient = 3.46, 95% CI = 0.83 to 6.10, p-value = 0.012). In multiple linear regression model, one log-unit increment in LCN2 was associated with 4.7 percent point increase in LSBMD at two years after parathyroidectomy (adjusted β=4.72, 95% CI = 1.62 to 7.82, p-value = 0.005) after adjustment of PTH, creatinine level, and body mass index. This result remained robust for 3 year change in LSBMD (in subgroup, n=14; adjusted β=4.70, 95% CI = 0.9 to 8.5, p-value = 0.021). In conclusion, preoperative high circulating LCN2 level was associated with more LSBMD gain after parathyroidectomy in patients with PHPT.

Bone and Mineral Metabolism

VITAMIN D, DIABETES AND ENERGY METABOLISM

Dress-Style Effect on Vitamin D3 Metabolic Profile

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Background and Objectives: Conservative clothing like niqab and hijab dress-style may affect the vitamin D metabolic parameters even in the predominantly sunny areas of the world, with adequate sunlight exposure throughout the year. Our objective is to evaluate the effect of wearing the niqab or hijab style on different vitamin D3 metabolic parameters in a sample of premenopausal women from Basrah. **Methods:** This was a cross-sectional observational study on premenopausal women who wore a niqab (n=64), with a comparable age-matched group of women who wore the hijab dress-style (n=60). Biochemical evaluation of the vitamin D3 metabolic profile involved 25-OH-vitamin D, corrected serum calcium, parathyroid hormone, phosphorus, and alkaline phosphatase estimation. Statistical comparison of these parameters was made using the independent sample t-test and Mann-Whitney-U test.
Results: The two groups of women were age- and weight-matched, with a median age was 39 years, and median body mass index (BMI) of 31.8 kg/m^2. Overall, age, marital status, and BMI of women in both groups had no significant relationship to the vitamin D3 metabolic parameters (low

25-OH-vitamin D, low corrected calcium, and high parathyroid hormone). The subgroup analysis for women with the niqab showed the same results. **Conclusions:** Wearing niqab or hijab dress-style by the premenopausal women was not associated with any significant statistical relationship or difference in vitamin D3 metabolic parameters.

Bone and Mineral Metabolism

VITAMIN D, DIABETES AND ENERGY METABOLISM

Effect of Cholecalciferol Supplementation on Bone Turnover Markers in Children and Adolescents With Type 1 Diabetes Mellitus

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Background: Cholecalciferol is known to play an important role in bone mineral metabolism. Its deficiency may affect growth and status of bone markers in children. **Aim of the study**: to evaluate the correlation between serum 25(OH)D and bone markers and impact of vitamin D supplementation on serum bone formation [procollagen type 1 amino-terminal propeptide (P1NP)] and bone resorption [β-cross laps (CTx)] markers among children and adolescents with type 1 diabetes mellitus (DM). **Materials and Methods:** Total 58 children and adolescents with type 1 DM, who were given 2000 UI of cholecalciferol supplementation, were included in the study. These 58 children with available anthropometry, serum biochemistry, 25-hydroxyvitamin D ([25(OH)D]), and parathormone (PTH) were evaluated for bone formation (procollagen type 1 amino-terminal propeptide [P1NP]) and resorption (β-cross laps [CTx]) markers. **Results:** The mean age and body mass index of these children were 11.6 ± 2.3 years (boys: 11.7 ± 2.4; girls: 12.2 ± 1.4 years; p = 0.04) and 18.2 ± 3.9 kg/m^2 (boys: 18.1 ± 3.8; girls: 17.8 ± 3.4 kg/m^2; p = 0.206), respectively. Baseline serum P1NP levels were positively correlated with serum phosphates (r = 0.281, p < 0.001), PTH (r = 0.291, p < 0.001), and CTx (r = 0.425, p < 0.001) but not with age (r = -0.016, p = 0.404), BMI (r = -0.080, p = 0.032), serum calcium (r = -0.038, p = 0.107), and baseline 25(OH) D (r = -0.069, p = 0.035). Postsupplementation serum P1NP and CTx levels maintained similar correlations. There was a significant decline in serum P1NP (from 681 ± 223 ng/ml to 630 ± 279 ng/ml, p < 0.01) and CTx (from 1.63 ± 0.51 ng/ml to 1.37 ± 0.53 ng/ml, p < 0.01) following supplementation. Though decline in serum P1NP and CTx levels was observed in both boys and girls, among all supplementation patients, the effect was more marked in serum CTx than P1NP levels. **Conclusions:** Vitamin D supplementation in children resulted in decrease in both bone formation (P1NP) and resorption (CTx). The impact, however, was more marked on bone resorption than bone formation.

Bone and Mineral Metabolism

VITAMIN D, DIABETES AND ENERGY METABOLISM

Effects of the Rate of Impaired Insulin Secretion on Bone Mineral Density in Type 1 Diabetes

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Background: Type 1 Diabetes mellitus (T1DM) is a well-known condition associated with low bone mineral density (BMD) and bone fracture, in which one of the risk factor is impaired endogenous insulin secretion. However, the association between the rate of impaired insulin secretory capacity in T1DM and BMD remains to be elucidated. **Objective:** To clarify the effect of the rate of impaired insulin secretion on BMD in T1DM. **Patients and Methods:** This a retrospective single-center cross-sectional study, in which consecutive one-hundred seventy Japanese patients with T1DM at Kobe University Hospital were registered. According to the diagnostic criteria of The Japan Diabetes Society, patients were stratified into three subtypes; acute-onset (AO) (n =51, male 25%, 39 ± 15 years), slowly-progressive (SP) (n =37, male 37%, 57 ± 14 years), and fulminant (F) (n =12, male 33%, 51 ± 15 years) mainly by insulin secretory capacity at onset of T1DM. Lumbar spine (LS) and femoral neck (FN) BMD Z-score between three groups were evaluated. **Results:** The LS BMD is lower in AO than SP (p =0.03), while no differences were observed compared to F (SP/AO/F; 0.38 ± 1.08/-0.25 ± 0.96/-0.35 ± 1.01). The FN BMD also tended to be lower in AO than in SP (p =0.08) and in F (p =1.00) (SP/AO/F;0.03 ± 1.01/-0.44 ± 0.96/-0.35 ± 0.70). To identify the factors associated with decreased BMD, the multivariate regression analysis was performed using AO and SP. The LS BMD was associated with the pathogenic group (p =0.01). Since a negative correlation was seen between durations and CPR both in AO and SP group (p <0.01, p <0.01), we divided these subjects into following 5 groups; 1 to 4, 5 to 9, 10 to 14, 15 to 19, and more than 20 years. In these groups, the CPR was lower in AO than in SP in 1 to 4 years (p <0.01). Intriguingly, LS BMD was started to decline in 5 to 9 years (p =0.03) and was still continued in 10 to 14 years (p =0.01). In FN, BMD was started to decline in 10 to 14 years (p =0.01), suggesting the BMD decline followed by impaired insulin secretion. However, the difference of both BMD and CPR between AO and SP groups were not seen in more than 15 years group, indicating this tangent BMD difference is link to the difference of insulin secretion. **Conclusions:** This study firstly showed that pathogenic subtypes of T1DM differently affected on BMD. A detailed examination of each disease period showed that BMD continued to decrease as impaired insulin secretion.

Bone and Mineral Metabolism

VITAMIN D, DIABETES AND ENERGY METABOLISM

Endocrinology, Vitamin D and the UK's Covid-19 Disaster