Secular Trends and Predictors of Hypovitaminosis D Across the Life Course: 2009-2016

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PURPOSE
We investigated prevalence, determinants, seasonal and secular trends in hypovitaminosis D, defined as a desirable serum 25OHD levels (25OHD) levels below 20ng/ml, among evaluating the 25OHD status in both adults and children.

METHOD
We analyzed serum 25OHD data from a large laboratory (N=151,394), of patients in our center.

Figure 2 PTH as a function of increasing 25OHD levels among adult women with normal creatinine.
Secular Trends and Predictors of Hypovitaminosis D Across the Life Course: 2009-2016

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**PURPOSE**
We investigated prevalence determinants, seasonal changes, and secular trends in hypovitaminosis D. We derived a descriptive serum 25-hydroxy-vitamin D (25(OH)D) levels in adults and elderly by evaluating the 25(OH)D-parathyroid hormone (PTh) relationship.

**METHODS**
Determined serum 25(OH)D levels from a database of 151,394 subjects, from 2009-2016. We calibrated 25(OH)D levels to LC-UV converters.

**RESULTS**
- The prevalence of hypovitaminosis D was 39% for adults and elderly, 36% for males, and 32% for females.
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**CONCLUSION**
- Evident seasonal effect in all age groups, and females were highest during summer.
- There was a significant steady annual increase in 25(OH)D levels between 2009-2016 (0.17 ng/ml/year). There was a significant steady annual increase in 25(OH)D levels between 2009-2016 (0.17 ng/ml/year).
- Using past f1 non-linear regression models on a subset of adults and elderly, the best combinations 25(OH)D and PTh data was available (N=5,083). PTh plateaus at a serum 25(OH)D level of 23.4 ng/ml.
Delta-like 1 (DLK1) is a Possible Mediator of Vitamin D Effects on Bone and Energy Metabolism

**BACKGROUND**
- Vitamin D is essential for effective cell function.
- Recent studies have suggested an emerging protective role for DLK1 against osteoporosis, metabolic syndrome, and multiple sclerosis.

**AIMS**
- To investigate the potential role of vitamin D3 supplementation on DLK1 expression.
- To explore the relationship between DLK1 and bone turnover markers.

**METHODS**
- Twenty healthy volunteers were randomized to receive either vitamin D3 (4000 IU/day) or placebo for 12 months.
- Bone turnover markers (osteocalcin, ICTP) and DLK1 expression were assessed at baseline and after 12 months.

**RESULTS**
- Significantly increased serum DLK1 levels were observed in the vitamin D3 group compared to the placebo group.
- Increased DLK1 expression was associated with lower osteocalcin levels.

**CONCLUSIONS**
- 12 months vitamin D3 supplementation increased serum DLK1 levels.
- DLK1 levels were positively associated with levels of bone turnover markers, insulin, C-peptide, and indices of insulin resistance.
- DLK1 levels were negatively correlated with DLK1, findings in line with its anti-inflammatory effect.
- Our analyses support the hypothesis that DLK1 can be targeted to regulate bone and energy metabolism.

**ACKNOWLEDGEMENTS**
- The Lebanese Council for National Scientific Research and the Lebanese University Hospital.
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**REFERENCES**
Delta-Like 1 (DLK1) is a Possible Mediator of Vitamin D Effects on Bone and Energy Metabolism

Aya Bassatine, MD; Abbas Safavi, PhD; Moustapha Kassim, MD, PhD; Christos Mantzoros, MD, PhD (Boston Children’s Hospital); Anwar Alami, MD, MSC.

Maya Rahme, MSC; Sara Ajjour, MSC; Mariam Assaad, MSC; George Halabi, MD; Rafic El-Bedweidy, MD, MPH; and Ghada El-Hajj-Fuleihan, MD, MPH.

Background: Vitamin D is well known for its effects on bone metabolism. Its anti-inflammatory properties make it of particular interest.

DLK1 is a transmembrane receptor with important roles in osteogenesis and adipogenesis.

DLK1 inhibits bone differentiation through pathways involved in osteogenesis and adipogenesis.

To assess:
- The effect of vitamin D supplementation on DLK1 expression in osteoblasts and adipocytes.

Results:
- DLK1 levels were positively associated with levels of bone turnover markers, insulin, and C-peptide, and indices of insulin resistance.
- A decrease in serum DLK1 levels was observed after 12 months of vitamin D supplementation.

Conclusions:
- DLK1 levels were positively associated with levels of bone turnover markers, insulin, and C-peptide, and indices of insulin resistance.
- A decrease in serum DLK1 levels was observed after 12 months of vitamin D supplementation.
- Our analyses support the hypothesis that DLK1 can be targeted to regulate bone and energy metabolism.
- Further studies are needed to explore the role of DLK1 in the regulation of vitamin D and other bone-related factors.
Secular Trends of Hip Fractures in Lebanon 2006 – 2017: Implications for Clinical Practice and Public Health Policy in the Middle East Region

**PURPOSE**
Country-specific hip fracture incidence rates (IRs) and long-term trends allow FRAX® to be adapted to individual countries. Secular trends can affect tool calibration. Data on hip fracture IRs in the Middle East is scarce, and long-term secular trend studies are non-existent.

**METHODS**
Using the Ministry of Public Health hip fracture registry, we calculated age and sex-specific hip fracture IR in Lebanon, from 2006-2017, among individuals aged ≥ 50 years. We used both linear regression and Kendall’s tau-c (τc) test to determine the correlation between time and hip fracture IRs.

- Total 8,865 hip fractures. 74% femoral neck fractures.
- Men constituted 32%, and were aged 77.7±10.5 years (p=0.001).
- Annual overall IRs per 100,000 population: 61.4 in 2015 to 41.1 in 2017 in men. IRs steadily increased with age.
- There was a significant negative correlation in hip fracture IRs by sex, with a steeper and earlier decrease in men.
- Consistent decline in hip fracture IRs for women aged 80 to 84 years.
- The severity decreases in IRs for men aged 65 to 74 years.

**RESULTS**
Figure 1: Secular trend in hip fracture IR per 100,000 individuals by year expressed as 3-year aggregates.

Figure 2: Age and gender hip fracture IRs trend 2006-2017, comparing IRs of the paired age groups.

**CONCLUSION**
Decline in hip fracture IRS observed, which changes on estimations is ceased, and may hold in the FRAX®.

**Figure 1** Secular trend in hip fracture IR per 100,000 individuals by year expressed as 3-year aggregates.

**Figure 2** Age and gender hip fracture IRs trend 2006-2017, comparing IRs of the paired age groups.
AUBMC

Disease Burden of Osteoporosis and Other NCDs in Lebanon

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BACKGROUND

- Non-communicable diseases (NCDs) are a major public health epidemic contributing to 70% of mortality worldwide.
- Osteoporosis is a silent yet costly disease causing major disabilities in the elderly, as well as social and psychological consequences.
- The yearly incidence of hip fractures is rapidly increasing due to increased global life expectancy, that is most accelerated in developing countries.
- In the US elderly women, the yearly incidence of fractures greatly exceeds that of other NCDs.

OBJECTIVES

To evaluate and compare disease burden from osteoporosis to other NCDs in Lebanon.

METHODS

- We assessed the prevalence of osteoporosis and other NCDs based on two published population-based studies (1, 2).
- We compared incidence rates of hip fractures and major osteoporotic fractures (MOF) to the five most common cancers.
- Rates were based on national hip fracture and cancer registry data, provided by the Lebanese Ministry of Public Health (3).

RESULTS

Figure 1: Prevalence of osteoporosis and major fractures, vertebral fractures, and other NCDs among 65+ people (65-85 years, mean age 74, 65% women) in Lebanon overall and by gender.

Figure 2: Average incidence rates per 100,000 people for hip fractures and the five most common cancers in Lebanese women 20 years or older, 2012-2014 and 2015-2017.

Figure 3: Average incidence rates per 100,000 people for hip fractures and the five most common cancers in Lebanese women 20 years or older, 2015-2017.

CONCLUSIONS

- This first of its kind study in the Middle East demonstrates that osteoporosis is a common disease, more common than most breast NCDs.
- Our findings are comparable to those in western populations, and justify placing osteoporosis on the top of NCDs' priority list in our region.

ACKNOWLEDGMENTS

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Secular Trends and Predictors of Hypovitaminosis D Across the Life Course: 2009-2016
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PURPOSE
We investigated prevalence determinants, age-related changes, and secular trends in hypovitaminosis D. We derived a desirable serum 25-hydroxy-vitamin D (25(OH)D) levels in adults and elderly by reviewing the 25(OH)D-parathyroid hormone (PTH) exponential relationship.

METHODS
We analyzed serum 25(OH)D data from a large laboratory database (N=151,364), of a major academic medical center in Lebanon, from 2009-2016. We used cross-capture formulas to convert measured 25(OH)D levels to LC-MS/MS equivalents.

RESULTS
- 6% were pediatric (mean age 11 ± 4 years, 57% girls), 39% were adults (44 ± 15 years, 71% women), and 25% were elderly (74 ± 6 years, 58% women).
- Hypovitaminosis D prevalence was defined as a 25(OH)D cutoff of 20 ng/ml, with a cut-off of 15 ng/ml across all ages.

Figure 2 PTH as a function of increasing 25(OH)D levels among adult and elderly with normal creatinine clearance expressed as mean ± 85% CI. The line represents 99% patients overlap for consecutive solid line represents an example of the trend and the present plateau 25(OH)D.
Disease Burden of Osteoporosis and Other NCDs in Lebanon

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BACKGROUND
- Non-communicable diseases (NCDs) are a major public health epidemic contributing to 70% of mortality worldwide.
- Osteoporosis is a silent yet costly disease causing major disabilities in the elderly, as well as social and psychological consequences.
- The yearly incidence of hip fractures is rapidly increasing due to increased global life expectancy, which is most acute in developing countries.
- In the US elderly women, the yearly incidence of fractures greatly exceeds that of other NCDs.

OBJECTIVES
To evaluate and compare disease burden from osteoporosis to other NCDs in Lebanon

METHODS
- We assessed the prevalence of osteoporosis and other NCDs based on two published population-based studies (1, 2).
- We compared incidence rates of hip fractures and major osteoporotic fractures (MOFs) to the five most common cancers.
- Rates were based on national hip fracture and cancer registry data, provided by the Lebanese Ministry of Public Health (3).

RESULTS

- Figure 1. Prevalence of osteoporosis and other NCDs among the elderly population of Lebanon (65+ years, 10,000 women) in 2010
- Figure 2. Average incidence rates per 100,000 person-years of hip fractures and the five most common cancers in women aged 50-64 years, 10,000 women in Lebanon overall and by gender

CONCLUSIONS
- This first of its kind study in the Middle East demonstrates that osteoporosis is a common disease, more common than most feared NCDs.
- Our findings are comparable to those in western populations, and justify placing osteoporosis at the top of NCDs' priority list in our region.

ACKNOWLEDGEMENTS
- All received training under the Scholars in Health Research Program (SHARP)
- Niluf Feghary International Center and Office of Dietary Supplements grant T043-4N05-115
- The content is solely the responsibility of the authors and does not necessarily reflect the official views of the National Institutes of Health.

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Lebanese National Cancer Registry
Fracture risk following bariatric surgery: a systematic review and meta-analysis of observational and interventional studies

Background
- Meta-analysis and review
- MEDLINE (1996 to present), EMBASE
- Interventions and outcomes: bone fractures
- Search strategy: "bariatric surgery" AND "fracture"

Methods
- Systematic review and meta-analysis
- Excluded non-bariatric surgery, compared to controls
- No data available on follow-up

Results
- The search strategy yielded 2,407 citations
- After full-text screening, 120 papers were excluded
- 18 studies included
- Trials and observational studies
- Participants: women from their forties, mean BMI: 34.5±10.3
- Fracture rate: 1.6% (1.0-2.2)
- Risk of bias assessment: item by item

Discussion/limitations
- Our review shows that fracture risk in patients undergoing a malabsorptive bariatric surgery procedure seems to be increased, compared to obese controls and those undergoing a restrictive procedure.
- Limitation of the available data:
  - Definition of "any" fracture variable across studies
  - Fracture identification: fractures (18 studies), based on self-report, not all used ICD codes
  - Few studies included non-surgical procedures
  - Recruitment methods: not all, but did not include a single center conducted on 13 out of 18 studies
  - Adjustment for participants missing information on exercise, preoperative medical status

Future
- Studies evaluating predictors of fractures with appropriate ascertainment of fractures in patients undergoing bariatric surgery.
Secular Trends of Hip Fractures in Lebanon 2006 – 2017:
Implications for Clinical Practice and Public Health Policy in the Middle East Region

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PURPOSE
Country-specific hip fracture incidence rates (IRs) and longevity allow FRAX® to be adapted to individual countries. Secular trends can affect tool calibration.

Date on hip fracture IRs in the Middle East is scarce, and long-term secular trend studies are non-existent.

METHODS

Using the Ministry of Public Health hip fracture registry, we calculated age- and sex-specific hip fracture IRs in Lebanon from 2006-2017, among individuals aged 55 years.

We used both linear regression and Kendall’s τ (τ) to determine the correlation between true and hip fracture IRs.

RESULTS

- Total IRs: hip fractures, 74% femoral neck, 23% intertrochanteric, and 3% subtrochanteric.
- Men: 58.2%, and were significantly younger than women (77.6 ± 11.0 yrs vs. 77.9 ± 13.3 yrs, p < 0.001).
- Annual overall IRs (IR) per 100,000 individuals ranged from 126.8 in 2014 to 213.2 in 2017 in women.
- IRs increased in a linear manner from 2006-2015 to 151.7 in 2017 in men. Average women to men IRs was 1.9 (range 1.5-2).
- IRs already increased with age and conservative age groups were increased in parallel series, with a steeper and earlier rise (by 5 years) in women.
- Consistent decline in hip fracture IRs starting in 2000 in men, and in 2009 in women.
- There was a significant negative correlation between time (2006-2015) and hip fracture IRs (b = -0.009, p = 0.016), and linear regression R^2 = 0.67, p = 0.003) and men (b = -0.017, p = 0.012, R^2 = 0.69, p = 0.001).
- The already decrease in FRAX® reversed after 2015 in both sexes.
Secular Trends of Hip Fractures in Lebanon 2006 – 2017: Implications for Clinical Practice and Public Health Policy in the Middle East Region

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PURPOSE

Country-specific hip fracture incidence rates (IRs) and longevity allow FRAX to be adapted to individual countries. Secular trends can affect tool calibration. Data on hip fracture IRs in the Middle East is scarce, and long-term secular trend studies are non-existent.

METHODS

Using the Ministry of Public Health hip fracture registry, we calculated age and sex-specific hip fracture IRs in Lebanon, from 2006-2017, among individuals aged ≥ 50 years. We used both linear regression and Kendall’s tau-b (tb) test to determine the correlation between time and hip fracture IRs.

RESULTS

Figure 1: Secular trend in hip fracture IR per 100,000 individuals by year (expressed per 100,000 individuals by year). The steady increase in IRs is consistent across both sexes. There was a significant increase in IRs for women (r=0.71; p=0.025; Figure 2: IRs trend by sex; p=0.037; Figure 3: IRs trend by sex; p=0.037; Figure 4: IRs trend by sex; p=0.037).

DISCLOSURE: None