

E18 PREDICTORS OF SITE OF FRACTURE IN PATIENTS WITH HISTORY OF PARENTAL FRACTURE

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Background: Parental history of fragility fracture (FF) confers an increased risk of further FF in all sites, independent of bone mineral density (BMD). Factors affecting site of FF in these patients are unknown. These were analysed in patients attending for BMD estimation.

Methods: Patients attending for dual energy X-ray absorptiometry scanning, between 2004 and 2016, with a history of parental FF, were included. Parameters recorded: femoral and vertebral BMD, height, weight, fat mass, age, smoking, alcohol, corticosteroid therapy, aromatase inhibitor therapy, Depo-Provera use, hormone replacement therapy, rheumatoid arthritis, polymyalgia rheumatica, breast or prostate cancer, coeliac disease, and site of fracture. Only patients with a single fracture were included. Logistic models were fitted to model site of FF, compared to all other FF in the cohort using the risk factors above.

e18 TABLE 1: Factors affecting fracture site (* denotes significant result)

Predictor/Fracture site	Forearm (n = 1002)	Tibia/fibula (n = 544)	Humerus (n = 235)	Femur (n = 157)	Ribs (n = 272)	Spine (n = 394)
Smoking	0.921 [0.741, 1.137]	1.318 [1.021, 1.686] *	1.219 [0.819, 1.764]	1.416 [0.877, 2.203]	1.769 [1.264, 2.437] *	1.119 [0.813, 1.514]
Alcohol	1.154 [0.869, 1.512]	0.983 [0.660, 1.414]	1.594 [0.976, 2.470] *	1.378 [0.717, 2.407]	1.649 [1.042, 2.495] *	1.296 [0.850, 1.901]
Corticosteroid	0.691 [0.502, 0.932] *	0.842 [0.561, 1.217]	0.688 [0.360, 1.215]	0.745 [0.333, 1.436]	0.689 [0.366, 1.208]	0.863 [0.526, 1.312]
Rheumatoid arthritis	1.038 [0.758, 1.394]	0.920 [0.596, 1.361]	1.564 [0.922, 2.495]	2.314 [1.333, 3.771] *	0.770 [0.382, 1.356]	1.515 [0.999, 2.215] *
Polymyalgia rheumatica (PMR)	1.281 [0.770, 2.037]	1.328 [0.687, 2.343]	0.732 [0.179, 1.963]	1.118 [0.273, 3.013]	0.622 [0.154, 1.680]	1.037 [0.434, 2.091]
Depo-Provera	2.079 [0.906, 4.386]	0.699 [0.113, 2.328]	4.280e-6 [1.676e-39, 1.626]	2.373e-6 [1.881e-61, 3.722e3]	0.712 [0.040, 3.339]	2.469e-6 [9.889e-40, 0.942]
Coeliac	0.605 [0.351, 0.977]	0.609 [0.287, 1.133]	0.476 [0.117, 1.265]	0.236 [0.013, 1.061]	0.841 [0.328, 1.759]	0.369 [0.113, 0.878] *
History of breast/prostate cancer	0.750 [0.361, 1.395]	0.700 [0.245, 1.575]	0.657 [0.108, 2.104]	0.491 [0.028, 2.233]	0.564 [0.092, 1.802]	0.579 [0.141, 1.560]
Female gender	2.311 [1.708, 3.202] *	1.421 [1.016, 2.050] *	1.267 [0.791, 2.170]	0.401 [0.270, 0.613] *	0.671 [0.470, 0.969] *	0.388 [0.288, 0.511] *
Hormone replacement therapy (HRT)	0.546 [0.383, 0.755] *	0.905 [0.612, 1.293]	0.438 [0.186, 0.867] *	0.473 [0.167, 1.045]	0.785 [0.433, 1.307]	0.521 [0.288, 0.863] *
Aromatase inhibitors	0.448 [0.311, 0.625] *	0.486 [0.298, 0.748] *	0.402 [0.170, 0.795]	0.810 [0.381, 1.510]	0.711 [0.393, 1.183]	0.617 [0.367, 0.971] *
Age at scan (years)	1.030 [1.027, 1.033] *	1.019 [1.015, 1.023] *	1.043 [1.037, 1.049] *	1.056 [1.048, 1.065] *	1.008 [1.003, 1.012] *	1.052 [1.048, 1.057] *
Height (cm)	0.977 [0.973, 0.982] *	0.998 [0.993, 1.004]	0.979 [0.971, 0.987] *	1.001 [0.990, 1.013]	1.003 [0.996, 1.010]	0.972 [0.966, 0.978] *
Weight (kg)	0.997 [0.996, 0.999] *	1.012 [1.010, 1.015] *	0.994 [0.990, 0.998] *	0.991 [0.985, 0.997] *	0.981 [0.977, 0.985] *	0.997 [0.994, 0.100] *
Average percentage fat	3.921 [2.710, 5.676] *	19.619 [12.078, 31.901] *	8.365 [4.176, 16.758] *	2.251 [0.831, 6.099]	0.146 [0.078, 0.272] *	4.613 [2.734, 7.789] *
BMD- L1-2 (g/cm ³)	0.082 [0.054, 0.122] *	0.724 [0.447, 1.166]	0.169 [0.082, 0.343] *	0.311 [0.126, 0.751] *	0.060 [0.030, 0.119] *	0.162 [0.093, 0.282] *
BMD- L1-4 (g/cm ³)	0.089 [0.060, 0.130] *	0.664 [0.418, 1.046]	0.140 [0.069, 0.281] *	0.505 [0.212, 1.174]	0.055 [0.028, 0.107] *	0.127 [0.074, 0.215] *
BMD- Left femoral total mean (g/cm ³)	0.003 [4.263e-6, 0.652]	0.267 [0.0002, 178.120]	0.889 [0.0001, 3070.715]	2.532e2 [1.994e-4, 4.722e9]	1.451e2 [1.037e-4, 1.709e9]	0.007 [3.460e-12, 12170.8]
BMD- Right femoral total mean (g/cm ³)	0.427 [0.0005, 230.984]	0.007 [8.226e-7, 10.611]	5.144 [2.826e-4, 97578.107]	36.651 [1.685e-6, 6.134e9]	1.190e4 [6.965e-2, 4.495e11]	1.912 [7.924e-6, 259121.771]
BMD- Right femoral neck mean (g/cm ³)	0.043 [0.026, 0.072] *	0.678 [0.367, 1.246]	0.023 [0.009, 0.061] *	0.002 [0.0002, 0.021] *	0.033 [0.014, 0.078] *	0.042 [0.020, 0.085] *
BMD- Right femoral neck mean (g/cm ²)	0.028 [0.016, 0.049] *	0.567 [0.291, 1.095]	0.032 [0.011, 0.092] *	0.001 [0.0001, 0.016] *	0.056 [0.022, 0.143] *	0.018 [0.008, 0.041] *

Results: 6053 patients (91% female) were included. 2094 patients (34.6%) had sustained a discreet FF. Table 1 shows factors affecting fracture risk at various sites. In general, smoking, alcohol, aromatase inhibitors, increasing age, height, and weight increased fracture risk in all long bones. HRT increased fracture risk in the arm and spine; female gender increased the risk in the leg and ribs. Corticosteroids increased the risk in the forearm and ribs. Rheumatoid arthritis increased fracture risk in the femur. Vertebral fracture risk was increased with all the above factors, and coeliac disease. Decreased right femoral BMD and vertebral BMD were associated with increased risk of fracture at all sites.

Conclusion: Different sites of fracture appear to be associated with different risk factors. The most common sites of fracture in our cohort were the peripheral long bones and vertebrae, with femur being the least common. As in the general population, corticosteroids, smoking, alcohol and aromatase inhibitors increase fracture risk in the long bones and vertebrae. Rheumatoid arthritis significantly increases fracture risk in the femur and spine suggesting a novel mechanism by which this occurs. Limitations of this study include lack of information on multiple fractures in one individual, and lack of dose and duration of medications.

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