

Fractures of the Radius in Women Aged 50 y and Over: A Study of Electronic Medical Records

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Background & Objectives

- Body Mass Index (BMI) has been implicated as risk factor for several types of fractures in postmenopausal women; the relationship has been best studied for hip fracture.
- Obesity (BMI $\geq 30\text{kg/m}^2$) has been associated in some studies with increased risk of ankle, upper leg, lower leg, and proximal humerus fracture in postmenopausal women, whereas decreased risk of hip and pelvis fractures has been reported in comparison with non-obese and underweight women.
- The relation has not been well studied for fracture of the radius, which was the objective of this study.

Methods

- TriNetX 'Analytics' (TriNetX, Cambridge, MA) is a live electronic medical record (EMR) database of >50M patients, predominantly from the US. Participating health care organizations include a mix of hospital, primary care, and specialty treatment providers. TriNetX aggregates information directly from EMR systems on a continuous basis.
- Female patients aged ≥ 50 y with a record of BMI were identified in the database (analysis 24-May-2019).
- Incident radius fractures occurring after the first recorded BMI were identified with ICD-10 codes (S52.X).
- The joint association of age (50 to 80 y in 5-y bands and one category for ≥ 80 y) and BMI (15 to 45 kg/m^2 in 5- kg/m^2 bands and one category for 45-60 kg/m^2) with radius fractures was assessed by calculating risk ratios (RR), with women aged 50 to <55 y and a BMI of 20 to <25 kg/m^2 being the referent.

Results

- Data of 1,066,780 women (33% with (BMI $\geq 30\text{kg/m}^2$) were analyzed. 15,758 women had a radius fracture, corresponding to an incidence of 14.8 per 1000 population.
- Incidence of radius fracture was 485/51,609 (9.4/1000 population) in the reference group aged 50 to <55 y with BMIs of 20 to <25 kg/m^2 , and ranged from 6.4/1000 at 50 to <55 y and 40 to <45 kg/m^2 to 29/1000 at ≥ 80 y and 15 to <20 kg/m^2 .
- Risk generally increased with age, with RR of 2.57 (95% CI 2.32 to 2.85) in women aged ≥ 80 y with a BMI of 20 to <25 kg/m^2 .
- Incidence was inversely related with BMI up to 40 to

<45 kg/m^2 for ages 50 to <55 y and up to 35 to <40 kg/m^2 for all other age categories.

- For instance, in women aged 50 to <55 y, compared to BMIs between 20 to <25 kg/m^2 , the RR (95% CI) was 1.31 (1.06 to 1.63) at BMIs of 15 to <20 kg/m^2 , then decreased to 0.68 (0.49 to 0.95) at BMIs of 40 to <45 kg/m^2 , and then went up to 1.00 (0.83 to 1.19) at BMIs of 45 to 60 kg/m^2 .
- Similar trends were present in other age groups, with the most dramatic one seen in women aged ≥ 80 y – the RR (95% CI) was 3.09 (2.72 to 3.51) at BMIs 15 to <20 kg/m^2 ; 1.20 (0.93 to 1.55) at BMIs 35 to <40 kg/m^2 ; and 1.99 (1.48 to 2.66) at BMIs 45 to 60 kg/m^2 .

Conclusions

- The incidence of fractures of the radius increased with age and was inversely related with BMI, with the exception of the highest BMI group in which risk was elevated.
- A strength of the study is the large sample size. Furthermore, fractures of the forearm are almost invariably presented to health care providers and diagnosis is relatively straightforward by X-ray. We are assuming that the assessment by clinicians for the need of X-rays does not depend age or BMI.
- Relationships found may be subject to confounding, and patient height or weight may be individual risk factors themselves instead of the BMI composite measure.

Figure: Risk ratios of fracture of the radius by age and BMI

