

**BACKGROUND:** Bone fracture in the elderly is a major cause of hospitalization<sup>(1)</sup>. Patients often become functionally dependent, either during immediate recovery or in the long term. 50% of the fractured patients do not recover their previous mobility and have higher mortality rates (specially femoral fractures)<sup>(1,2)</sup>. The major causes include falling, bathing or during rehabilitation therapy<sup>(3-6)</sup>. Immobilism syndrome, whether due to previous motor problems, altered bone metabolism (osteoporosis) or associated clinical conditions, is considered a risk factor for pathological fractures<sup>(1-5)</sup>. The risk of hip fracture among Home Health Care (HHC) patients, hospital in home, reaches 24.4 per 1000 individuals per year<sup>(7)</sup>.

An algorithm was created by the World Health Organization (WHO) to predict the risk of hip fracture and osteoporotic fracture in 10 years (FRAX®)<sup>(8,9)</sup>. The risk is given in percentage (%) considering the following variables<sup>(8,9)</sup>:

- 1) Body Mass Index (BMI);
- 2) personal history of previous fracture with characteristic location of osteoporosis;
- 3) family history of hip fracture;
- 4) smoking;
- 5) use of glucocorticoids (Prednisone ≥ 5 mg/day or equivalent);
- 6) alcoholism
- 7) diagnosis of rheumatoid arthritis (RA), associated or not with the result of bone densitometry of the femoral neck.

**SETTING AND CONTEXT:** Home Doctor is a Brazilian company covering more than 100 cities in the country. With its biggest unit in São Paulo city provides 500 patients an integrative care model. Nursing care is provided with a minimum of 12 hours/day and a multidisciplinary team surveillance is held 2 to 3 times a week (general practitioners, physical therapy, nutritionist, phono audiology and psychologist).

**PROBLEM:** evaluate the risk of hip fracture and major osteoporotic fracture in 10 years among patients in HHC according to the FRAX® tool. Improve patient safety and surveillance in bone fracture.

**METHODOLOGY AND ASSESSMENT OF PROBLEM:** Cross-sectional, retrospective, observational study of patients, aged between ≥40 and ≤90 years. Stratified in high and low complexity:

- **High complexity**, clinical condition demanding daily nursing care (12-24h/day), multidisciplinary care (doctor, physiotherapy and speech therapy), and frequent invasive or non-invasive ventilation;
- **Low complexity**, condition demanding physical or respiratory rehabilitation without continuous nursing support (6 hours/day);

Patients were selected from databases (electronic medical records on 25/05/2016). Incomplete medical records were excluded from the poll of analysis. The risk of fracture was assessed through the FRAX online calculator available at (www.shef.ac.uk/FRAX) including clinical data without Bone Mineral Densitometry (BMD). FRAX tool estimates the risk of major osteoporotic fracture and hip fracture in 10 years. It was considered high hip fracture risk of hip above 3% and a high major osteoporotic fracture risk above 20%, according to previous literature<sup>(8)</sup>. Data were expressed in absolute number (n), relative frequency (%), mean, standard deviation (±) and probability value (p). This project was approved in 20/04/2016 and follows the regulations of the Law number 8.142 (November 28<sup>th</sup>, 1990) from the Brazilian National Council of Ethics and Research (CONEP).

**RESULTS, MEASUREMENT:** 393 patients were eligible, 171 were excluded due to incomplete medical records. From the 222 patients analysed, the age range ranged from 41 to 90 years; 131 women with a mean of 71.5 (± 13.2) years and 91 men with a mean age of 66.9 (± 14.8) years. Patients over 60 years old corresponded to 70.2% of the cases (n = 156), with a predominance of females (n = 98, 62.8%).

Sequelae of cerebral infarction [I69.3], Chronic Obstructive Pulmonary disease [J44.9], dementia NEC [F03], Sequelae of intracerebral haemorrhage [69.1] and Sequelae of Fractures (Hip, Femur, Lumbar, cervical, Toracica) accounted for 53% of primary HHC diagnosis according to the International Disease Classification 10 (ICD-10).

According to the FRAX tool, the average risk of bone fracture in 10 years was higher in those with high complexity (without statistical significance), female (<0.001) and had a direct correlation with the increase in age range (<0.001) (table 1).

83 (37.7%) patients had high fracture risk, of which 81 (36.7%) had hip fracture risk above 3%. Of these, 18 of them were aged between 70 and 80 years (17 females and 1 males) and 63 were between 80 and 90 years old (51 females and 12 males). The risk of osteoporotic fracture above 20% occurred in only 2 female patients (0.1%), both older than 80 years. Progressive increased risk by age groups are shown on Graphs 3 and 4.

**CONCLUSION, LESSONS LEARNT:** The fracture risk assessment using the FRAX® tool in HHC demonstrated an increased risk of hip fracture and osteoporotic fracture as the age progresses, both of which were higher in females than in males. Malnutrition was significantly associated with increased risk of hip fracture. No other variable evaluated by the FRAX® tool correlated directly fracture risk in this evaluated population. Further evaluation of the incidence of fractures in the specific subpopulation of patients in home care through a cohort study may be an interesting alternative. Evaluate additional risk factors related to this population, including specially the causes of malnutrition are fundamental as improvement of safety among HHC patients.

**Table 1. Mean and standard deviation (SD) of Osteoporotic and Hip fracture risk at 10 years according to gender, age range, clinical complexity, corticoid therapy, history of previous fracture and BMI.**

SEX	N	MEAN (SD) OSTEOPOROTIC FRACTURE RISK IN 10 YEARS (%)	P	MEAN (SD) HIP FRACTURE RISK IN 10 YEARS (%)	P
Female	131	7,9 (±5,2)		3,7 (±3,4)	
Male	91	3,7 (±2,2)	<0,001*	1,7 (±1,8)	<0,0001*
AGE GROUP	N	MEAN (SD) OSTEOPOROTIC FRACTURE RISK IN 10 YEARS (%)	P	MEAN (SD) HIP FRACTURE RISK IN 10 YEARS (%)	P
Adult	66	2,6 (±1,1)		0,3 (±0,3)	
Elderly	156	7,7 (±4,8)	<0,001*	3,9 (±3,0)	<0,001*
AGE RANGE	N	MEAN (SD) OSTEOPOROTIC FRACTURE RISK IN 10 YEARS (%)	P	MEAN (SD) HIP FRACTURE RISK IN 10 YEARS (%)	P
40 - 50	27	2,4 (±1,0)		0,2 (±0,3)	
51 - 60	40	2,7 (±1,2)		0,4 (±0,3)	
61 - 70	35	3,3 (±1,7)		1,0 (±0,9)	
71 - 80	52	6,4 (±3,2)		3,3 (±2,4)	
> 80	68	11,1 (±4,6)	<0,001*	6,0 (±2,7)	<0,001*
BMI	N	MEAN (SD) OSTEOPOROTIC FRACTURE RISK IN 10 YEARS (%)	P	MEAN (SD) HIP FRACTURE RISK IN 10 YEARS (%)	P
<18,5	9	6,5 (±3,9)		4,1 (±3,7)	
18,5-24,9	111	6,5 (±5,2)		3,2 (±3,5)	
25-29,9	59	6,6 (±4,6)		2,8 (±2,5)	
30-34,9	29	5,4 (±3,5)		2,0 (±1,2)	
>35	14	3,9 (±2,7)	0,2711*	1,2 (±1,2)	0,0464*
CLINICAL COMPLEXITY	N	MEAN (SD) OSTEOPOROTIC FRACTURE RISK IN 10 YEARS (%)	P	MEAN (SD) HIP FRACTURE RISK IN 10 YEARS (%)	P
Low Complexity	96	5,8 (±4,6)		2,7 (±2,8)	
High Complexity	126	6,5 (±4,8)	0,1936*	3,0 (±3,2)	0,3030*
PREVIOUS BONE FRACTURE AND/OR OSTEOPOROSIS	N	MEAN (SD) OSTEOPOROTIC FRACTURE RISK IN 10 YEARS (%)	P	MEAN (SD) HIP FRACTURE RISK IN 10 YEARS (%)	P
None	198	5,9 (±4,4)		2,8 (±2,9)	
Present	24	8,6 (±6,5)	0,0114*	3,6 (±4,2)	0,3628*
CORTICOID THERAPY*	N	MEAN (SD) OSTEOPOROTIC FRACTURE RISK IN 10 YEARS (%)	P	MEAN (SD) HIP FRACTURE RISK IN 10 YEARS (%)	P
None	204	6,2 (±4,7)		2,9 (±3,0)	
Present	18	6,8 (±4,6)	0,2543*	3,0 (±3,7)	0,7642*
<b>TOTAL</b>	<b>222</b>	<b>6,2 (±4,7)</b>		<b>2,9 (±3,0)</b>	

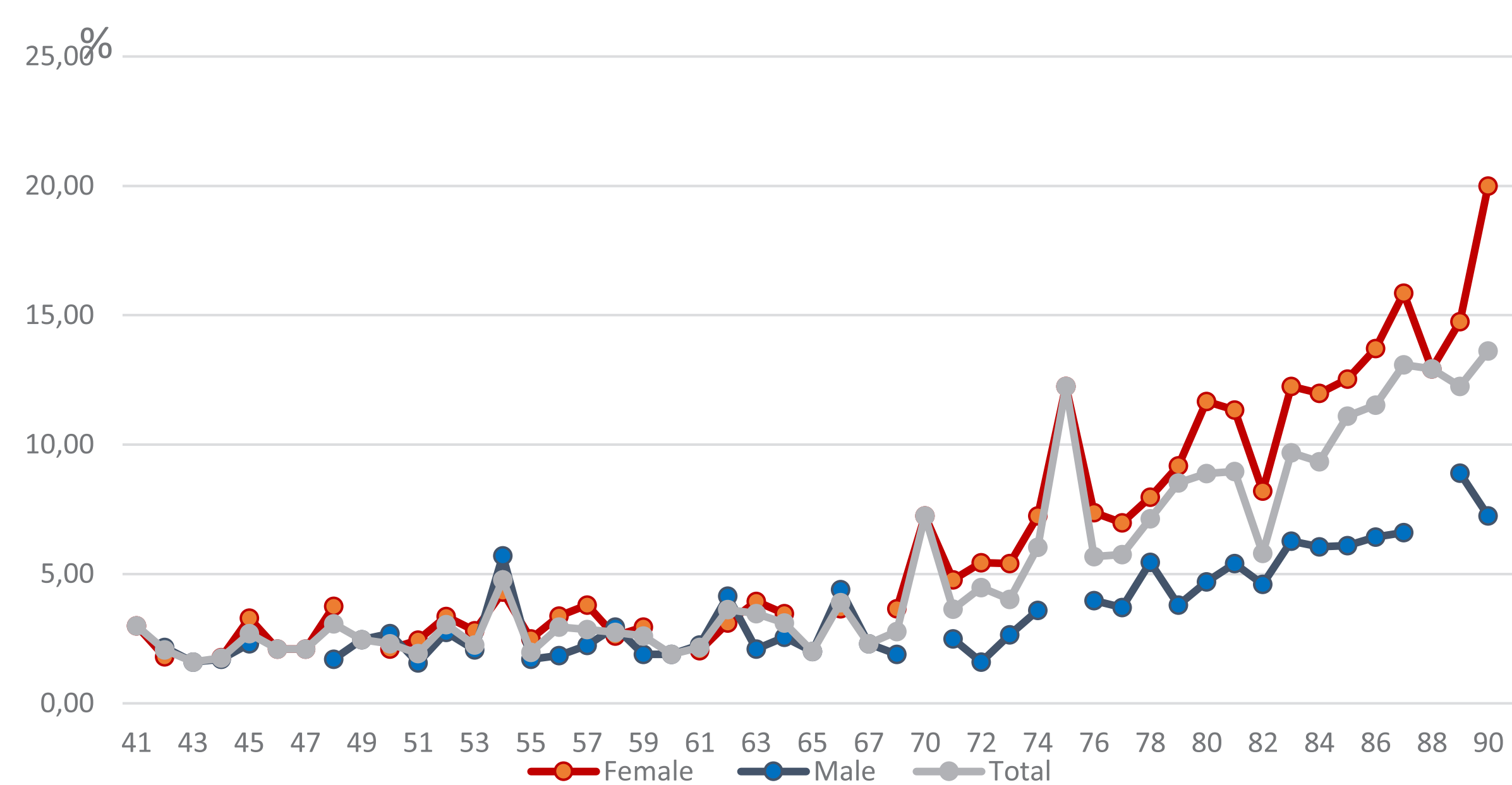
\* corticosteroid therapy for more than 3 months under the dose of 5mg/day Prednisone or equivalent  
a) Mann-Whitney test; b) ANOVA test; values of p in bold indicate p <0.05 (significance)

**Table 2. Comparison of hip and osteoporotic fractures risks according to age (years) in the present study and by Looker et al. (8)**

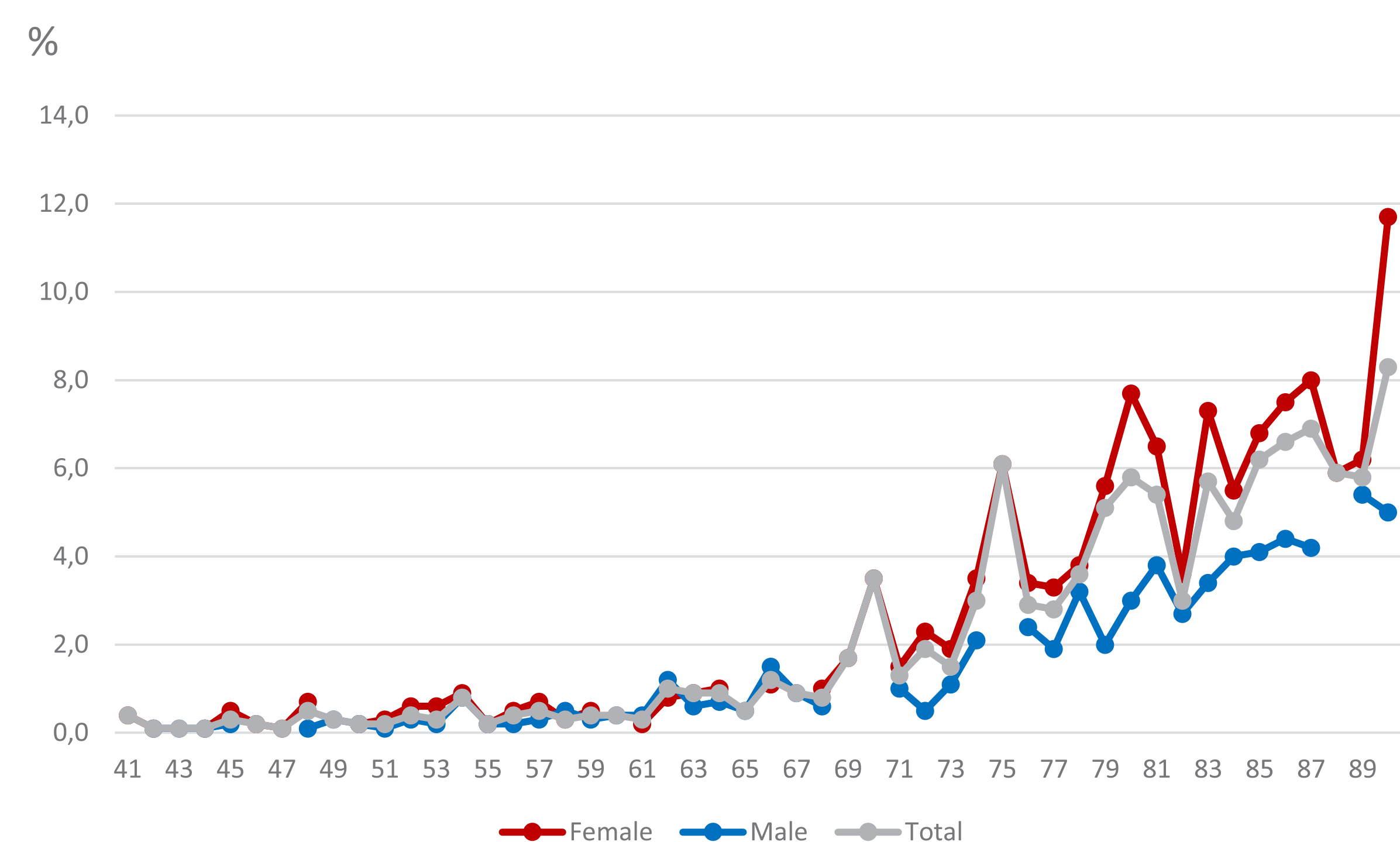
FRACTURE RISK IN 10 YEARS	PRESENT STUDY	LOOKER ET AL. 2017
<b>HIP</b>		
40-50 years	0,24	0,1
51-60 years	0,39	0,38
61-70 years	0,99	0,86
71-80 years	2,65	2,41
>80 years	5,66	*
<b>OSTEOPOROTIC</b>		
40-50 years	2,39	2,59
51-60 years	2,73	5,54
61-70 years	3,34	7,77
71-80 years	6,15	9,57
>80 years	12	11,57

\*inaccurate values with SD >50%.

**Graphic 3 – Osteoporotic Bone Fracture Risk in 10 years according to FRAX® (%), age (years) and sex.**



**Graphic 4 – Hip Bone Fracture Risk in 10 years according to FRAX® (%), age (years) and sex.**



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