Assesment of Risks of Hip Fractures in Sub-Urban Population of Muzaffarnagar on "Frax" Mathods

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I.   Introduction

Bones are living tissue and constantly changing. From the moment of birth until young adulthood, bones are developing and strengthening. Our bones are at their most dense in our early 20s – called peak bone mass. (International osteoporosis foundation- IOF.)

Osteoporosis is the most common metabolic bone disorder, and it affects all population and up to 40% of postmenopausal women (1) & leading to fractures.

It is considered a silent disease because bone loss occurs without symptoms or signs, and approximately two-thirds of vertebral fractures are asymptomatic. Osteoporosis with fractures frequently goes unrecognized (2) in the clinical settings.

Osteoporosis, which literally means porous bone, is a disorder in which the density and quality of bone are reduced. As bones become more porous and fragile, the risk of fracture is greatly increased. The loss of bone occurs silently and progressively.

The National Institutes of Health Consensus Development Panel on Osteoporosis Prevention, Diagnosis, and Therapy defines osteoporosis as a skeletal disorder characterized by low bone strength and increased risk of fracture.

This definition of osteoporosis reflects the changing perspective on this disease, means osteoporosis is no longer considered a disorder of low bone mineral density alone.

Osteoporosis and fractures are closely associated

The World Health Organization's FRAX tool calculates a patient's 10-year fracture risk. FRAX assigns a statistical weight to a patient's risk factors, such as age, bone density, history of previous fractures, and family history.

Frax:

Fracture Risk Assessment Tool (FRAX), enables clinicians to tell patients, "You have a 1 in 10, or perhaps even a 1 in 2, chance of fracturing your hip in the next 10 years. Let's see what we can do to lower your risk."

(Laura L. Tosi, MD, and Richard M. Dell, MD-Challenging orthopaedics to reduce osteoporotic hip fractureswww.aaos.org/news/aaosnow/may09/research5.asp)

The aims of our study was assessment of the hip Fracture Risk, in sub-urban population of our area, using the Fracture Risk Assessment Tool (FRAX)

II.   Material And Methods

Determination Of Bone Mass Density Was Done In 220 Patients Of Age Group Ranging Between 40 Years To 90 Years.

For this 106 males and 114females were selected, at KHATAULI sub-urban area of distt. Muzaffarnagar, U.P. India, using guidelines of FRAX TOOL CALCULATOR.

Calculation tool was taken for country INDIA under ASIA region specified in the tool.

All the RISK-FACTORS were included in our study in the form of Questionnaire , to determine the fracture probability of hip fractures, predicted by this tool

(FRAX tool - University of Sheffield **www.shef.ac.uk/**FRAX/**tool.aspx.)**

Following are the risk factors and their details as given with the tool applied (FRAX.)

Notes on risk factors:

Previous fracture a special situation pertains to a prior history of hip fracture. A fracture detected as a radiographic observation alone counts as a previous fracture. A prior clinical hip fracture is a strong risk factor.

Smoking, alcohol, gluco-corticoids

These risk factors appear to have a dose-dependent effect for osteoporosis, means higher is the dose or exposure, greater is the risk. However dose factor has not been taken into account, in FRAX tool.

Rheumatoid arthritis (RA)

RA is a risk factor for fracture. However, osteoarthritis is, if anything, protective. For this reason reliance should not be placed on a patient's report of 'arthritis' unless there is clinical or laboratory evidence to support the diagnosis.

Bone mineral density (BMD)

The site and reference technology is DXA at the femoral neck. T-scores are based on the reference values for women aged 20-29 years. The same absolute values are used in men.

III.   Discussions

The aim of FRAX is to provide an assessment tool for the prediction of fractures in men and women with use of clinical risk factors with or without femoral neck bone mineral density.

These clinical risk factors include age, sex, race, height, weight, body mass index, a history of fragility fracture, a parental history of hip fracture, and use of oral glucocorticoids, rheumatoid arthritis and other secondary causes of osteoporosis, current smoking, and alcohol intake of three or more units daily.

FRAX calculates the ten-year probability of a major osteoporotic fracture (in the proximal part of the humerus, the wrist, or the hip or a clinical vertebral fracture) and of a hip fracture calibrated to the fracture and death hazards.

The initial FRAX model required a T-score calculated by means of a so-called FRAX patch; however, in February 2009, FRAX was revised so that clinicians could either enter T-scores or select the manufacturer of the densitometry equipment (such as Hologic, GE Lunar, or Norland) and enter the femoral neck bone mineral density in grams per square centimeter.

In addition to the clinical risk factors, the geographic area in which each individual resides should be considered in the fracture risk assessment. Fracture probability varies markedly among different regions of the world.

FRAX allows fracture risk to be calculated for countries where the incidences of both fractures and mortality are known.

Currently, a FRAX model is available for Austria, China, Germany, France, Italy, Japan, Spain, Sweden, Switzerland, Turkey, the United Kingdom, the United States, Argentina, Belgium, Finland, Hong Kong, Lebanon, and New Zealand.

In a country where there is no FRAX model, a representative surrogate country should be chosen.
It must be emphasized that the calculated ten-year fracture probability is only a guideline for treatment decisions. Specific treatment decisions should be individualized.

Some clinical risk factors, such as the use of glucocorticoids, have already been considered indications for treatment of osteoporosis.

Limitations of FRAX

There are several important limitations that need to be considered when FRAX is used as a calculation tool. The relationships between risk factors and fracture risk incorporated within the FRAX model have been constructed from the primary data of nine population-based cohorts around the world. (3, 4.5).

Databases from most of the countries incorporated into FRAX provided accurate rates of hip fractures because all patients with a hip fracture are admitted to a hospital. However, patients with a wrist or proximal humeral fracture are usually treated as outpatients, leading to an underestimation of the incidence of these types of fractures.

Assessing the rate of clinical vertebral fracture is also challenging since it is difficult to distinguish between patients with a clinical vertebral fracture and patients who have back pain with an incidental vertebral compression fracture. Therefore, the reported rates of major osteoporotic fractures at sites other than the hip may not be accurate.

Kanis et al (6) studied the use of clinical risk factors to predict osteoporotic fractures on the basis of baseline and follow-up data from nine population-based cohorts.
In addition, FRAX may not accurately predict fracture risk across all age groups (7) . Furthermore, fracture risk probabilities calculated with FRAX are not valid for patients who have already received pharmacologic treatment for osteoporosis such as bisphosphonates.Other important risk factors for fractures are not included in this calculation tool. These include the serum level of 25-hydroxyvitamin D, physical activity, risks of falls, and

biochemical bone markers. Life style (sedentary or active), Therefore, the calculated risk may be less than the actual risk.

Nevertheless, FRAX remains an important tool that represents an advance in the care of osteoporosis. The current FRAX model provides an aid to enhance patient assessment by the integration of clinical risk factors alone and/or in combination with bone mineral density.

IV. Conclusion

In our series of 220 individuals were registered for our study, out of which 106 were males and 114 were females. Group wise distribution based on the various age groups is as shown in TABLE No. 1.

Maximum no. of patients were in age group between 40 years to 50 years and minimum in age group 81 years to 90 year group.

Most of cases of osteoporosis were found in age group of 40 years to 50 years in males 16 (7.2%) ?, and age group 51 years to 60 years in females 16 (7.2%)?.

This indicates that rate of notable decrease in bone density and thereby bone strength was found after the age of 50 years in female population.

As far as fracture probability is concerned 12 males (11.32%) of male population and 28 females (19.44%) female were found to have probability of risk of hip fractures in ten year duration, on the basis of FRAX guidelines. Who were found to have frax score of ≥ 3%

The maximum no. of fracture risks were noted in age group 71 years to 80 years of age females of this age groups 05 female (35.7%) were having fraxx score of ≥ 3% & 02 male (20.22%) of same age group.

There was no difference in percentage of fracture risks, in females between age group of 51 to 60 years and males in age groups 71 to 80 years With overall risks to 18.18% to all (both males and females).

This indicates that female population is at fracture risks, the most in the age past 50 years ,while males in their age group 61 years to 70 years.

Keeping in view this high percentage of risk factors, both males as well as in females requires further studies, evaluation and active measures, especially after the 50 years of age in females and 60years in males, for prevention and treatment of hip fractures probability, in this area.

Treatment of osteoporosis should be considered for patients with low bone mineral density and a ten-year risk of hip fracture of ≥3% as assessed with FRAX.

Measurements of biochemical bone marker levels can be used not only to monitor treatment efficacy but also to assess fracture risk and help select patients for therapy.

It is anticipated that the development of new imaging tools to evaluate bone quality will improve the assessment of a patient's fracture risk and response to treatment in the future.

References

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[10]. KEY WORDS: - 1- FRAX (Fracture Risk Assessment Tool), 2- Osteoporosis

Table No. 1 Distribution of patients Based on Age and sex

Age Group (in yrs)	No. of patients	Percentage age of total patient	Sex	
			Male	Female
40-50	108	49.09 %	62	46
51-60	60	27.28%	20	40
61-70	24	109%	10	14
71-80	20	9.09%	8	12
81-90	8	3.6	4	4
	220	100	106	78

Table No. 2 Distribution of patient

Age Group	1 <- 1.1.0-25	Male 2 2-5	3				
40-50.6							
51-60							
61-70							
71-80							
81-90							

Table No. 2 Distribution of patient's percent ages osteopenal Osteoporosis in both sexed

Age in years Group wise	Male							
	BMD -1 to -2.5	Percentage	Osteoporosis More than –2.5	Percent age	BMD -1 to -2.5	percent age	Osteoporosis More than- 2.5	Percent age
40-50	46	20.9	16	7.2	38	17.2	8	3.6
51-60	8	3.6	12	5.4	24	10.9	16	7.2
61-70								
71-80								
51-90								

Table No. 3 Age/sex wise distribution of fracture probability

	Male	Age percentage	Female	Age percentage
40-50	3	7-5%	4	10%
51-60	0	0	6	15%
61-70	6	15%	10	15%
71-80	2	5%	6	15%
81-90	1	2.5%	2	3.9%
Total	12		28	

Fracture Probability
Bar Graph
Introduction of fracture probability