



**ORIGINAL RESEARCH PAPER**

**Orthopaedics**

**TO MEASURE SINGH INDEX OF PROXIMAL FEMUR AND ITS RELATION TO HIP FRACTURES**

**KEY WORDS:** Singh Index , Neck Of Femur And Intertrochanteric Fracture

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**ABSTRACT**

Fractures of the proximal femur are responsible for a significant share of the hospitalizations that result from trauma cases. On the basis of the anatomical position of the fracture, they are categorized as fracture of the neck of the femur, fracture of the intertrochanteric and subtrochanteric region. Diagnosing and treating fractures of the proximal femur, it is extremely helpful to be aware of the angle of inclination of the broken bone. The Singh index, which is a measurement that is based on internal architecture trabecular patterns, is used to measure osteoporosis.

**INTRODUCTION-**

Osteoporosis is a disease of bone that leads to an increased risk of fractures. In osteoporosis the bone mineral density (BMD) is reduced, bone microarchitecture is disrupted, the amount and variety of noncollagenous proteins in bone is altered. Osteoporosis is most common in women after menopause, called postmenopausal osteoporosis, but may also develop in men. It may occur in the presence of particular hormonal disorders, other chronic diseases or as a result of medications, especially glucocorticoids, in this case the disease is called steroid- or glucocorticoid induced osteoporosis. Osteoporosis has the risk of fragility fracture and it may significantly affect life expectancy and quality of life. The Singh index, which is a measurement that is based on trabecular patterns, is used to measure osteoporosis. It is now generally known that the bone mineral density of a person's skeleton is a key factor in determining the likelihood that they would break a bone in their lifetime. The proximal femur bone is studied anatomically in order to have a better understanding of several elements of the clinical disease condition. These characteristics include the typical site of fracture as well as changes in bone density.<sup>2</sup> Although osteoporosis is more common in women, men account for up to 30 percent of fragility fractures. Hip fractures, particularly those of the femoral neck and intertrochanteric, are becoming more and more widespread all over the world. The radiographic patterns and bone density of the proximal femur are used in the Singh index, which is a tool for determining whether or not a person has osteoporosis.<sup>7</sup> The proximal femur is formed of two primary trabecular systems that are oriented along the lines of compressive and tensile stresses produced during weight-bearing. The index ranges from grade 1 to grade 6, and it is used to measure the internal architecture of the proximal femur.<sup>8,9</sup>



**Singh Index-**

- Grade-6-all the normal trabecular groups are visible
- Grade-5-principal tensile and principle compressive trabeculae is accentuated
- Grade-4-principal tensile trabeculae are markedly reduced in number but can be traced
- Grade-3-break in continuity of the principal tensile trabeculae opposite greater trochanter
- Grade-2-only principal compressive trabeculae stand out prominently
- Grade-1-principal compressive trabeculae are markedly reduced in number and no longer prominent.

**MATERIALS AND METHODS**

**Study Design-**Cross-sectional study.

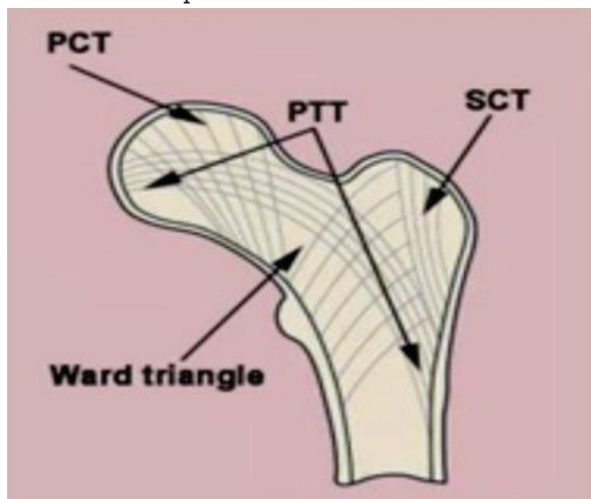
- After ethical committee approval and informed consent,
- a pre-designed proforma drafted for the study was used.
- Examination and routine investigations will be done on the normal side of the hip, i.e., contralateral to fracture hip.

**Singh Index-**

-measured on digital anteroposterior (AP) plain radiographs of the pelvis with bilateral hip and trabecular pattern in the proximal femur will be graded from 1 to 6.<sup>3</sup>

**Case Study**

The minimum number of patients required to test is estimated with a 5% level of significance, and the precision of the study at 15% is equal to 52. The study population consisting of patients aged more than 60 years with fracture around the hip, presenting to the orthopedic department of YMC from



November 2020 to August 2022 are included in the study after explaining the procedure and getting the consent. Patients admitted with fracture neck of femur and intertrochanteric fracture in the Department of Orthopaedics, Yenepoya Medical College Hospital, Mangalore, during the period of November 2020 to August 2022.

### DISCUSSION

A significant portion of trauma patients are admitted to the hospital as a result of proximal femur fractures. Females have a rate of these fractures that is two to three times higher than the male population.

They are categorized as follows based on the anatomical position of the fracture: fractures of the femur's neck and the intertrochanteric region

In our study mean age of the study participants was  $67.42 \pm 5.60$  years and around 48.1% were males, and 51.9% were females around 21.15% had neck of femur fracture right side, 19.23% had neck of femur fracture left side, 38.46% intertrochanteric fracture right side, and 21.15% intertrochanteric fracture left side.

In our study, we had a series of 52 cases of fractures around the hip. 27 were female patients, and 25 were male patients. There were 31 cases of intertrochanteric fracture and 21 cases of fracture neck of femur. After evaluating the Singh index, there were 10 cases of grade 4 (19.3%), 27 cases of grade 3 (51.9%), 14 cases of grade 2 (26.9%), and 01 case of grade 1 (1.9%).

### CONCLUSIONS

Assessing the changes in trabecular bone using the algorithms - Singh index, early detection of osteoporosis will become possible, which will be an important contribution to raising the standard of healthcare. In our study, we found that patients with a fracture around the hip had significantly low Singh index. Majority of fracture neck femur fractures and intertrochanteric fractures were seen in Singh index grade 3 in our study. Hence we can conclude that a Singh index of less than 4 is a higher risk for fracture around the hip, and the Singh index can be used to predict the risk of fracture around the hip.

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