

## A DESCRIPTIVE STUDY OF TREATMENT PATTERNS IN POST-FRACTURE OSTEOPOROSIS PATIENTS AT A HOSPITAL IN DENPASAR

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### ABSTRACT

**Introduction:** Post-fracture osteoporosis is associated with increased morbidity and risk of recurrent fractures, particularly in elderly patients. Information regarding fracture patterns and treatment practices in Indonesia remains limited. **Objective:** This study aimed to describe fracture patterns and medication use in patients with post-fracture osteoporosis at a hospital in Denpasar, Indonesia. **Methods:** A descriptive retrospective study was conducted using medical records of hospitalized patients diagnosed with post-fracture osteoporosis between 2022 and 2024. Data collection was performed from August to October 2025. Total sampling was applied based on eligibility criteria, such as diagnosed with post-fracture osteoporosis and receiving therapeutic care. Demographic characteristics, fracture locations, clinical manifestations, and medication use were analyzed descriptively. **Results:** A total of 15 patients were included in the study. The majority were elderly males (>53%). Hip fractures and lower extremity fractures were the most common sites, each accounting for 33,3% of cases, followed by upper extremity fractures (20,0%) and spinal fractures (13,3%). Pharmacological management was predominantly symptomatic, with etoricoxib being the most frequently prescribed analgesic (75%). Eperisone was the only muscle relaxant used (33,3%), while calcium–vitamin D supplementation was administered to some patients as supplements (13-33%). **Conclusion:** Hip and lower extremity fractures were the most common in patients with post-fracture osteoporosis, with treatment mainly focused on symptomatic management. The limited use of disease-modifying therapy suggests a gap between clinical practice and guideline-recommended long-term osteoporosis care.

**Keywords:** : Post-fracture osteoporosis; fracture pattern; treatment pattern; osteoporosis therapy

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## INTRODUCTION

Osteoporosis is a systemic skeletal disorder characterized by low bone density and structural degradation, leading to an increased risk of fractures, especially in older adults (1,2). Fragility fractures are associated with significant morbidity, functional decline, and a higher risk of subsequent fractures (3).

Post-fracture osteoporosis management involves acute fracture care and long-term pharmacotherapy to prevent recurrent fractures. Guideline-recommended treatments include bisphosphonates, denosumab, and calcium-vitamin D supplementation (4,5). However, real-world practices often differ from guidelines due to patient comorbidities, hospital resources, and prescribing behaviors.

In Indonesia, data on fracture patterns and pharmacological management of post-fracture osteoporosis remain limited. Understanding current clinical practices is essential to identify gaps between guideline recommendations and actual patient care. This study aimed to describe the fracture patterns and medication use in patients with post-fracture osteoporosis at a hospital in Denpasar, Indonesia.

## METHODS

### *Study design and setting*

This was a descriptive retrospective study conducted at a public military hospital in Bali. Data were collected from August to October 2025, based on medical records of patients hospitalized between 2022 and 2024. The study protocol was approved by the Health Research Ethics Committee of Stikes Kesdam IX/Udayana (08/EC-KEPKSK/VII/2025). Patient confidentiality was maintained throughout the study.

### *Eligibility Criteria and Sampling Technique*

Inclusion criteria were: 1) patients diagnosed with post-fracture osteoporosis; 2) hospitalized between 2022 and 2024; 3) medical records contained sufficient data on demographic characteristics, clinical symptoms, and other relevant information related to post-fracture osteoporosis. Patients diagnosed with osteoporosis but not receiving pharmacological treatment were excluded. A total sampling approach was used, including all eligible patients during the study period.

### *Operational Definition*

The pattern of post-fracture osteoporosis treatment was defined as the type of therapy and medications used by patients following fragility fractures due to osteoporosis.

### *Data Collection and Analysis*

Relevant data were extracted from patient medical records, including demographic characteristics, fracture sites, symptoms, and medication usage. Descriptive statistical analysis was performed to summarize patients' characteristics and treatment

## RESULTS

There were 15 patients with post-fracture osteoporosis included in this study based on the inclusion criteria. Patients' characteristics are presented in Table 1. The majority were elderly males (>53%). Based on fracture location, four main regions were identified: the hip and pelvis, spine, upper extremities, and lower extremities. Osteoporotic fractures in the hip and pelvis were located in the femur, acetabulum, and ramus. The spine involved the vertebrae and the lumbar spine. Meanwhile, fractures of the upper extremities (radius and humerus) and lower extremities (ankle, foot, and lower leg) accounted for 53.33% of all cases. Clinical manifestations in all patients included swelling,

erythematous bruising, pain, and deformities.

**Table 1.** Patients' Demographic and Clinical Profile

| Characteristics                                | n (%), N = 15 |
|------------------------------------------------|---------------|
| <b>Patients' Sex</b>                           |               |
| Male                                           | 8 (53,33)     |
| Female                                         | 7 (46,67)     |
| <b>Patients' Age</b>                           |               |
| <60 (young older adults)                       | 6 (40,00)     |
| ≥60 (elderly)                                  | 9 (60,00)     |
| <b>Payment Status</b>                          |               |
| Government-funded                              | 15 (100)      |
| <b>Type of osteoporotic fracture (by site)</b> |               |
| Hip & pelvis                                   | 5 (33,33)     |
| Spine (vertebral)                              | 2 (13,34)     |
| Upper extremity                                | 3 (20,00)     |
| Lower extremity                                | 5 (33,33)     |

### Medication Use Among Patients with Post-Fracture Osteoporosis

Table 2 summarizes the types of medications and dosages used by patients with post-fracture osteoporosis in this study. The medications were classified into four categories: analgesics, muscle relaxants, supplements, and other supportive agents. Etoricoxib was the most frequently used drug to reduce pain, administered to approximately three-quarters of the patients. Eperisone was the only muscle relaxant used, prescribed to about one-third of the patients. Musculoskeletal supplements, including vitamin-mineral preparations and certain herbal products, were used by 2–3 patients. In addition, all patients received intravenous albumin during hospitalization.

**Table 2.** Medication Use Profile in Post-Fracture Osteoporosis Patients

| Dosage Regimen*                        | n (%), N = 15 |
|----------------------------------------|---------------|
| <b>Analgesic</b>                       |               |
| Etoricoxib 90 mg BID                   | 12 (75,00)    |
| Acetaminophen 650 mg BID               | 1 (6,67)      |
| Pregabalin 57 mg OD                    | 1 (6,67)      |
| <b>Muscle Relaxant</b>                 |               |
| Eperisone 50 mg BID                    | 5 (33,33)     |
| <b>Supplements and Musculoskeletal</b> |               |
| Vitamin D3 5000IU BID                  | 5 (33,33)     |
| Calcium 500 mg BID                     | 2 (13,33)     |
| Glucosamine 250 mg TID                 | 2 (13,33)     |
| Glucosamine++** BID                    | 2 (13,33)     |
| Herbal supplement*** BID               | 3 (20,00)     |
| Vitamin B Complex OD                   | 2 (13,33)     |
| <b>Supportive</b>                      |               |
| Albumin i.v                            | 15 (100)      |

**Note:** \*All therapy was given per oral, except albumin.

BID: twice daily; OD: once daily; TID: three times daily

\*\*Glucosamine++: glucosamine 750 mg, chondroitin Sulfate 400 mg, methylsulfonylmethane 200 mg, manganese sulfate 0.5 mg, magnesium glycerophosphate 10 mg, Zn 6.25 mg, vitamin C 50 mg, vitamin E 25 mg

\*\*\*Herbal supplement: *Stichopus vriegatus* extract 500 mg

## DISCUSSION

The present study found that more than half of the patients with post-fracture osteoporosis were elderly males. Aging is a well-established risk factor for osteoporotic fractures due to progressive bone loss, reduced bone remodeling capacity, and deterioration of bone microarchitecture. Moreover, elderly individuals are more susceptible to falls secondary to sarcopenia, impaired balance, and multiple comorbidities, which collectively increase the risk of fragility fractures and subsequent post-fracture osteoporosis (6,7).

Although osteoporosis is more commonly associated with postmenopausal women, elderly men also represent an important and frequently underdiagnosed population. Age-related declines in testosterone and estradiol contribute to progressive bone loss in men, while secondary causes such as chronic diseases and medication-induced osteoporosis further increase fracture risk [8,9]. These factors may explain the predominance of elderly male patients in the current study, highlighting the need for increased awareness and earlier screening for osteoporosis in male populations, particularly after the occurrence of fragility fractures.

All the included patients were covered by the government. Patients with post-fracture osteoporosis in Indonesia may receive medical care coverage through the National Health Insurance administered by 'BPJS Kesehatan', provided that the services are medically indicated and follow the applicable referral procedures under the national health insurance system (4,10).

The predominance of hip and lower extremity fractures aligns with current evidence indicating that weight-bearing sites are particularly susceptible to fragility fractures in elderly patients due to age-related bone loss and increased fall risk (11,12). Vertebral fractures were relatively less frequent in this study, which may reflect underdiagnosis, as these fractures are often asymptomatic or overlooked in routine clinical evaluations (13,14). These findings underscore the importance of fall prevention strategies and early screening for osteoporosis, particularly in patients at risk for lower extremity and hip fractures.

The medication pattern observed in this study reflects a predominantly symptomatic and supportive approach. The widespread use of analgesics such as etoricoxib aligns with guideline recommendations emphasizing pain control as a primary component of osteoporotic fracture management. National and international guidelines

highlight that pain management should be individualized and may include NSAIDs or COX-2 inhibitors for short-term use in acute fracture-related pain (4,15). Given its anti-inflammatory properties, the more frequent use of etoricoxib may be advantageous compared with acetaminophen, as the clinical manifestations in this study included not only pain but also swelling and erythematous bruising, which reflect an underlying inflammatory process.

However, safety concerns regarding etoricoxib use in elderly patients should be considered. Although it is effective and has lower gastrointestinal toxicity than non-selective NSAIDs, it carries potential cardiovascular risks (15). Acetaminophen may therefore be preferred in patients with higher cardiovascular, renal, or gastrointestinal risk profiles (16).

Muscle relaxants such as eperisone were used in a subset of patients, likely to address secondary muscle spasm due to immobilization or compensatory musculoskeletal strain. In addition, the use of vitamin and mineral supplements reflects supportive care aimed at improving musculoskeletal health (4), although the frequency was limited and not standardized across patients. Glucosamine and/ or chondroitin, for example, are not the primary therapy for osteoporosis, but they may relieve symptoms related to joint inflammation and accelerate fracture healing (17). Another unique pattern observed in this study was the use of herbal medicine, specifically *Stichopus variegatus* extract, which is derived from sea cucumber. This extract is rich in antioxidants and has been reported to exhibit osteogenic activity in vitro, suggesting potential bone regeneration and wound-healing supportive properties (18).

Albumin infusion is not included in standard osteoporosis treatment guidelines; however, its use in this study may reflect underlying malnutrition or hypoalbuminemia, which is frequently

associated with osteoporotic fractures and abnormal bone health in elderly patients [19]. Malnutrition has been widely reported in geriatric orthopedic populations and is associated with delayed fracture healing, increased complications, and prolonged recovery. Serum albumin is commonly used as a clinical marker of nutritional status, and hypoalbuminemia has been consistently linked to poorer outcomes following fracture-related hospitalization and surgery (20–22). Nevertheless, the presence of hypoalbuminemia could not be confirmed in this study due to the absence of serum albumin laboratory data in the available dataset.

The national guideline for osteoporosis emphasizes anti-osteoporotic pharmacotherapy, including bisphosphonates, denosumab, and calcium–vitamin D supplementation, as core long-term strategies to reduce future fracture risk (4). However, the relatively limited use of disease-modifying osteoporosis agents in this study may indicate underutilization of guideline-directed therapy in post-fracture management. In this study, calcium and vitamin D supplementation were the only osteoporosis-specific therapies administered to some patients. Furthermore, the short duration of hospitalization may not fully capture the continuity of long-term osteoporosis treatment initiated after discharge.

This study provides a descriptive overview of fracture patterns and medication use in patients with post-fracture osteoporosis in a hospital setting, offering real-world insight into clinical practice in a resource-limited sample. The findings highlight the predominance of hip and lower extremity fractures, as well as the reliance on symptomatic pharmacotherapy, particularly analgesics, alongside limited use of disease-modifying osteoporosis agents. These observations may be useful in identifying potential gaps between clinical practice and guideline-

recommended long-term osteoporosis management.

Several limitations should be acknowledged. The small sample size and single-center design limit the generalizability of the findings. Also, the retrospective nature of data collection restricted access to certain clinical parameters, such as laboratory data (e.g., serum albumin and bone mineral density), which limited deeper interpretation of nutritional and metabolic status. The short observation period during hospitalization also did not capture post-discharge continuity of osteoporosis therapy.

Future studies with larger, multicenter populations and longer follow-up periods are recommended to better evaluate treatment patterns, adherence to guideline-directed therapy, and long-term outcomes in post-fracture osteoporosis patients. Incorporating biochemical and functional parameters would also provide a more comprehensive understanding of patient status and therapeutic needs.

## CONCLUSION

Among the included patients with post-fracture osteoporosis in this study, hip and lower extremity fractures were the most common (33%). Treatment mainly focused on symptomatic management, including analgesic agents (75%), supplementation (33%), and supportive albumin (100%). The limited use of disease-modifying therapy suggests a gap between clinical practice and guideline-recommended long-term osteoporosis care.

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## Informed Consent Statement

Informed consent was waived by the institutional ethics committee due to the

retrospective nature of the study and the use of anonymized patient data.

#### Conflict of interest

The authors declare that they have no conflicts of interest related to this study.

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