CLINICAL MENIFESTATIONS AND IMAGING FINDINGS OF PATIENTS WITH LUMBAR DEGENERATION COMBINED WITH OSTEOPOROSIS

ABSTRACT

Objective: To describe the clinical characteristics, imaging findings, and associated risk factors of patients with spinal degenerative disease and concurrent osteoporosis at the Department of Out-patient General Clinic, 108 Military Central Hospital.

Materials and Methods: This cross-sectional study included 120 patients diagnosed with both spinal degenerative disease and osteoporosis (T-score \leq -2.5). Data were collected through clinical examinations, structured interviews, and imaging assessments, including X-rays and MRIs, to evaluate spinal structural abnormalities and associated complications.

Results: The majority of patients were female (86.7%) and aged \geq 70 years (62.5%). Common clinical symptoms included lumbar spine pain (100%), spinal deformities such as kyphosis or scoliosis (73.6%), radicular pain, and paresthesia (63.2%). Imaging findings revealed vertebral compression fractures in 20.8% of X-rays, spondylolisthesis in 38.7%, and spinal canal stenosis in 45.6% of MRI results, with 23% showing vertebral fractures. Identified risk factors included prolonged corticosteroid use (39.2%), physical inactivity (69.2%),hypertension (35.8%), and multiple childbirths (≥ 4) in 75.8% of female patients. Advanced age was significantly associated with osteoporosis,

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with patients aged ≥ 70 years having a 4.5-fold higher risk compared to **younger groups.**

Conclusions: Patients with spinal degenerative disease and osteoporosis exhibit significant structural abnormalities, pain, and neurological symptoms, often reflecting advanced disease stages. These findings highlight the need for early screening, modification of risk factors, and comprehensive imaging assessments for proper diagnosis and management. Targeted interventions, including lifestyle modifications and reduced corticosteroid use, could help disease burden in high-risk mitigate the populations.

Keywords: Osteoporosis, Clinical Characteristics, Imaging Findings, Risk Factors, Spinal Degenerative diseases.

I. INTRODUCTION

Spinal degenerative disease (SDD) and osteoporosis are two prevalent musculoskeletal conditions that significantly impact the elderly population, leading to chronic pain, functional impairment, and decreased quality of life. SDD encompasses a range of degenerative changes, including intervertebral disc degeneration, facet joint osteoarthritis, spinal canal stenosis, and spondylolisthesis, which often result in nerve compression and structural instability. Concurrent osteoporosis exacerbates these conditions by reducing bone density and increasing the risk of vertebral fractures, further contributing to spinal deformities and neurological complications [1,2]. The burden of osteoporosis is increasing globally due to populations, facing significant aging challenges in managing its complications [3].

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Studies have shown that osteoporosis frequently coexists with SDD, aggravating symptoms such as chronic back pain, radicular pain, and restricted mobility. Vertebral fractures, a common consequence of osteoporosis, are a major source of disability in elderly individuals with SDD [4]. Despite the availability of diagnostic tools, both SDD and osteoporosis remain underdiagnosed and undertreated in Vietnam [5]. Many patients seek medical attention only after experiencing severe pain or functional impairment, leading to delayed intervention. Moreover, lifestyle-related risk factors such as physical inactivity, smoking, excessive alcohol consumption, and prolonged corticosteroid use have been linked to the progression of both conditions [6]. Understanding the clinical manifestations and imaging characteristics of patients with coexisting SDD and osteoporosis is essential for improving early detection, treatment strategies, and patient outcomes. However, there is limited research in Vietnam focusing on the clinical and radiological characteristics of patients with SDD and osteoporosis. This study aims to describe the clinical features, imaging findings, and associated risk factors of patients diagnosed with both spinal degenerative disease and osteoporosis at the Department of Out-patient General Clinic, 108 Military Central Hospital.

II. MATERIALS AND METHODS

2.1. Study design: This was a crosssectional descriptive study conducted at the General Clinic Department of 108 Central Military Hospital from July to October **2024**

2.2. Materials: This study included patients diagnosed with SDD and

osteoporosis based on a T-score ≤ -2.5 measured at the femoral neck and/or lumbar spine. A total of 120 patients were enrolled according to predefined inclusion and exclusion criteria. Inclusion Criteria: (1) Patients aged \geq 50 years; (2) Diagnosed with osteoporosis using DXA (Dual-energy X-ray Absorptiometry) with a T-score ≤ -2.5 at the femoral neck and/or lumbar spine; (3) Willing to participate and provide informed consent. Exclusion Criteria: (1) Patients with secondary osteoporosis due to underlying conditions such as hyperthyroidism, hyperparathyroidism, malignancies, or chronic renal failure; (2) Patients who had been undergoing osteoporosis treatment prior to enrollment; (3) Patients with severe physical or mental conditions that hindered participation in clinical evaluation and imaging studies.

2.3. Data Collection: Data collection was designed to achieve the study's objectives of describing clinical characteristics, imaging findings, and analyzing associated risk factors: A structured questionnaire was used to record demographic data, medical history (e.g., corticosteroid use, hypertension, and physical activity), and clinical symptoms (e.g., lumbar pain, spinal deformities, radicular pain, and paresthesia). X-rays were used to identify vertebral compression fractures and spondylolisthesis. Magnetic Resonance Imaging (MRI) was employed to assess spinal canal stenosis, herniated discs, and other structural abnormalities. Bone mineral density (BMD) was measured at the femoral neck and lumbar spine using DXA to confirm osteoporosis.

2.4. Data Analysis: Data were processed using SPSS version 20. Descriptive statistics were applied to summarize clinical, demographic, and imaging characteristics.

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Relationships between risk factors and osteoporosis were analyzed using Chi-square tests and logistic regression models. Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated to evaluate the strength of associations. A p-value < 0.05 was considered statistically significant.

2.5. Ethical Considerations: Written informed consent was obtained from all

participants. Patient confidentiality and data anonymity were maintained throughout the study in accordance with the principles of the Declaration of Helsinki. This comprehensive methodology ensured the study's rigor in describing clinical and imaging characteristics and identifying key factors associated with osteoporosis in the target population.

III. RESULTS

Demographic Characteristics Number of patients		Percentage (%)			
Gender					
Female	104	86.7			
Male	16	13.3			
Age group (years)					
50 – 59	18	15.0			
60 - 69	27	22.5			
≥70	75	62.5			
Occupation					
Farmers	56	46.7			
Workers	31	25.8			
Office staff	11	9.2			
Others	22	18.3			

Comments:

The demographic data indicate that osteoporosis predominantly affects females (86.7%) and older individuals, with 62.5% of patients being 70 years or older. Farmers make up the largest occupational group (46.7%).

Clinical Characteristics	Clinical Characteristics Number of patients (n=120)			
Lowback pain	120	100		
Radicular pain and paresthesia	76	63.2		
Spinal deformities	57	47.5		
Limited spinal mobility	65	54.2		
Wheelchair-dependent	31	25.8		

Table 2: Clinical Characteristics

Comments:

Radicular pain and paresthesia (63.2%) reflect nerve root compression often caused by vertebral fractures or spinal stenosis. Lumbar spine pain (100%), limited lumbar spinal mobility (54.2%) and spinal deformities (47.5%) remain the dominant clinical manifestations, illustrating the disease's profound impact on the musculoskeletal and nervous systems.

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Tuble 5. Inlaging Findings					
Image findings	Number of patients (n=120)	Percentage (%)			
X-ray					
Vertebral compression fracture	25	25 20.8			
Spondylolisthesis	46	38.3			
Spinal deformities (Scoliosis, Kyphosis)	53	44.1			
MRI					
Lumbar spinal stenosis	55	45.8			
Lumbar disc herniation	31	25.8			
Vertebral compression fractures	28	23.3			

Table 3: Imaging Findings

Comments: The imaging results reveal significant structural abnormalities among patients with spinal degenerative disease and osteoporosis. X-ray findings indicate a 20.8% prevalence of vertebral compression fractures, 38.3% of spondylolisthesis, and 44.1% of spinal deformities (including scoliosis and kyphosis). MRI findings highlight a 45.8% prevalence of lumbar spinal stenosis, 25.8% of lumbar disc herniation, and 23.3% of vertebral compression fractures.

<i>Tuble</i> 4. Kelauonsinp Detween Kisk Factors and Osteoporosis						
Risk factor	Number of patients (n)	Percentage (%)	р	Odds Ratio (95% CI)		
Gender (=120)						
Female	104	86.7	0.018	0.4 (0.2–0.9)		
Male	16	13.3				
Age group (years	s)					
50 – 59	18	15.0				
60 – 69	27	22.5	0.007	1.8 (1.0–3.2)		
≥70	75	62.5	0.001	4.2 (2.3–7.9)		
Corticosteroid Us	se					
Yes	47	39.2	0.02	2.3 (1.3–4.0)		
No	73	60.8				
Physical activity						
Regular	37	30.8	0.005	3.1 (1.5–6.5)		
Sedentary	83	62.9				
Hypertension						
Yes	43	35.8	0.02	1.9 (1.1–3.5)		
No	77	64.2				
Childbirths (Fem	ale)					

Table 4: Relationship Between Risk Factors and Osteoporosis

Comments: Female patients had a significantly higher prevalence of osteoporosis compared to males (p = 0.015). The prevalence of osteoporosis increased significantly with age, with patients \geq 70 years being 4.2 times more likely to have osteoporosis than those aged 50-59 (p = 0.001). Patients with prolonged corticosteroid use had 2.3 times higher odds of developing osteoporosis (p = 0.02). Sedentary patients were 3.1 times more likely to have osteoporosis than those with regular physical activity (p = 0.005). Women with \geq 5 childbirths were 4.5 times more likely to have osteoporosis than those with \leq 2 childbirths (p = 0.002). Hypertensive patients were 1.9 times more likely to have osteoporosis than non-hypertensive individuals (p = 0.02).

16.5

49.5

34.0

0.008

0.002

17

52

35

<u>≤2</u> 3-4

≥5

2.7 (1.3-5.6)

4.5 (2.0-10.1)

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IV. DISCUSSION

This study comprehensively evaluates the clinical, imaging in patients with SDD and osteoporosis and risk factor profiles of osteoporosis in a cohort of 120 patients, with diagnosis based on T-score \leq -2.5 at the lumbar spine and/or femoral neck. The reveal findings that osteoporosis predominantly affects elderly females (86.7%), particularly those aged \geq 70 years (62.5%) (Table 1). This demographic pattern aligns with global evidence suggesting that postmenopausal women experience accelerated bone loss due to estrogen deficiency, a key factor in bone remodeling [7]. Clinically, lumbar spine pain was reported in all patients (100%), and radicular pain with paresthesia (63.2%) suggested nerve root compression, potentially caused by vertebral fractures or spinal stenosis (Table 2). Spinal deformities, such as kyphosis or scoliosis (47.5%), and limited spinal mobility (54.2%) (table 2) were common, emphasizing the physical and functional burden of the disease [8]. Imaging findings highlighted structural damage, with showing vertebral X-rays compression fractures in 20.8% and spondylolisthesis in 38.3%. MRI findings, which provided more detailed assessments, revealed spinal stenosis in 45.8%, lumbar disc herniation in 25.8%, and vertebral fractures in 23.3%, indicating advanced disease stages (Table 3) [9][10]. Risk factor analysis demonstrated significant associations with osteoporosis (Table 4). Prolonged corticosteroid use (39.2%)increased the odds of osteoporosis by 2.3 consistent corticosteroids' times. with inhibitory effects on bone formation [11]. Sedentary lifestyles were prevalent in 69.2% of patients, with inactivity associated with a osteoporosis. 3.1-fold higher risk of

Multiparity was another critical factor, with women having ≥ 5 childbirths being 4.5 times more likely to develop osteoporosis, likely due to prolonged calcium depletion during pregnancy and breastfeeding [12]. Hypertension (35.8%) also showed a 1.9-fold higher risk, suggesting that oxidative stress and inflammation may play a role in osteoporosis pathophysiology [13]. These findings underscore the need for targeted prevention strategies, early imaging-based diagnosis, and interventions addressing modifiable risk factors such as physical inactivity and corticosteroid use. Integrating lifestyle changes with early treatment can significantly reduce osteoporosis-related morbidity and improve patients' quality of life.

V. LIMITATIONS

This study has several limitations that should be considered. First, the sample size of 120 patients may limit the generalizability of the findings to broader populations, especially in diverse healthcare settings. Second, the cross-sectional design restricts the ability to establish causation between risk factors and osteoporosis.

VI. CONCLUSION

study This highlights the clinical characteristics and imaging findings in patients with lumbar degenerative disease and concurrent osteoporosis (T-score \leq -2.5), predominantly affecting elderly females. Key clinical symptoms include lumbar spine pain, spinal deformities, and restricted mobility, while imaging findings reveal vertebral fractures, spinal stenosis, and spondylolisthesis, indicating significant structural deterioration. Identified risk factors

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include advanced age, sedentary lifestyle, prolonged corticosteroid use, hypertension, multiparity, underscoring and the multifactorial nature of the disease. These results emphasize the need for early screening, lifestyle modifications, and targeted management strategies to improve outcomes in high-risk populations. Future research should focus on larger and longitudinal studies to further validate these findings and optimize treatment approaches.

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