

Analysis of 710 Patients with Osteoporosis in the Department of Rheumatology

Guoqing ZHAO¹, Donglin HAO², Lamei ZHOU^{1*}

1. Department of Rheumatology, Wuxi Traditional Chinese Medicine Hospital, Wuxi 214000, China; 2. Department of Rheumatology, Suzhou Hospital of Traditional Chinese Medicine Affiliated to Nanjing University of Chinese Medicine, Suzhou 215000, China

Abstract [Objectives] To analyze the clinical characteristics, distribution of traditional Chinese medicine (TCM) syndrome types, and the current treatment status of osteoporosis (OP) among inpatients in the Department of Rheumatology. [Methods] A retrospective analysis was performed on the clinical data of 710 inpatients diagnosed with OP at the Department of Rheumatology, Wuxi Traditional Chinese Medicine Hospital, between January 2019 and December 2021. [Results] During the same period, the 710 OP patients took up 28.86% of the total inpatient population in the Department of Rheumatology. The male-to-female ratio was about 1 : 3.86, with the majority of patients (61.97%) aged between 60 and 80 years. The incidence of brittle fractures was 3.94%. In terms of treatment, the utilization rates of calcium supplements and vitamin D were 74.93% and 90.70%, respectively, while the usage rates of anti-OP medications, including bisphosphonates and calcitonin, were 42.54% and 17.18%, respectively. The primary TCM syndrome type identified was liver-kidney deficiency, accounting for 37.89% of cases. The five most prevalent comorbidities were rheumatoid arthritis (50.14%), Sjogren's syndrome (14.65%), osteoarthritis (13.94%), ankylosing spondylitis (5.92%), and gout (5.07%), listed in descending order of frequency. Distinct patterns were observed in the gender, age, and distribution of TCM syndrome types across the various comorbidities. [Conclusions] The prevalence of OP among inpatients in the Department of Rheumatology is relatively high. Variations exist in population characteristics and TCM syndrome types when OP co-occurs with different rheumatic diseases. Clinical management of OP remains suboptimal, highlighting the need to enhance standardized treatment and health management.

Key words Osteoporosis (OP), Rheumatic disease, TCM syndrome type, Medication statistics, Inpatient

1 Introduction

With the progressive aging of the Chinese population, the prevalence of osteoporosis (OP) is increasing, significantly impacting patients' quality of life. OP is commonly observed in rheumatic diseases such as rheumatoid arthritis (RA), Sjogren's syndrome (SS), ankylosing spondylitis (AS), osteoarthritis (OA), and gout. This study employs a retrospective analysis to statistically examine OP inpatients at Wuxi Traditional Chinese Medicine Hospital over the past three years.

2 Materials and methods

2.1 General information Data were collected from patients discharged from Wuxi Traditional Chinese Medicine Hospital between January 2019 and December 2021, whose X-ray findings indicated OP in the lumbar vertebrae or hip joints. These patients were included in the study for statistical analysis.

2.2 Criteria for diagnosis and case inclusion

2.2.1 Diagnostic criteria. The diagnosis of OP was based on the *Guideline for the Diagnosis and Management of Primary Osteoporosis*^[1]. According to the guideline, a bone density value less than 1 standard deviation below the peak bone mass of normal adults of the same gender and ethnicity was considered normal, whereas a reduction of ≥ 2.5 standard deviations was indicative of OP.

2.2.2 Inclusion criteria. Patients admitted to the Department of Rheumatology at Wuxi Traditional Chinese Medicine Hospital between January 2019 and December 2021 were selected for this study.

2.3 Research methods The pertinent data of inpatients were collected and subjected to statistical analysis, primarily encompassing general demographic and clinical information such as gender, age, comorbidities, treatment medications, TCM syndrome types, and the presence of concurrent fractures. Bone density measurements of the lumbar vertebrae and hips were conducted using a bone densitometer produced by Hologic Inc. (Natus Neurology Dantec™ KEYPOINT), comprising components such as the collimator/drum filter model ASY 03954, radiation source model 010 0575, and X-ray controller model ASY 00409. The results were reported as *T*-scores (*T* values).

3 Results and analysis

3.1 Number of patients From January 2019 to December 2021, the hospital recorded a total of 2 460 inpatients, of whom 710 were OP cases, taking up 28.86% of the total. Specifically, in 2019, there were 996 inpatients, including 268 OP patients (26.90%). In 2020, the inpatient count was 739, with 214 OP patients (28.96%). In 2021, the hospital admitted 725 inpatients, among whom 228 were OP patients, accounting for 31.45% (Table 1).

3.2 Gender Among the total patient population, 146 were male, accounting for 20.56%, and 564 were female, taking up 79.44%. Specifically, in 2019, there were 57 male and 211 female patients; in 2020, 48 male and 166 female patients; and in 2021, 21 male and 187 female patients (Table 2).

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Guoqing ZHAO, doctoral degree, associate chief physician of traditional Chinese medicine. * Corresponding author. Lamei ZHOU, doctoral degree, chief physician of traditional Chinese medicine.

Table 1 Number of OP patients

Year	Number of inpatients// case	Number of OP patients// case (%)
2019	996	268 (26.90)
2020	739	214 (28.96)
2021	725	228 (31.45)
Total	2 460	710 (28.86)

Table 2 Gender of OP patients

Year	Gender// case (%)	
	Male	Female
2019	57 (21.27)	211 (78.73)
2020	48 (22.43)	166 (77.57)
2021	41 (17.98)	187 (82.02)
Total	146 (20.56)	564 (79.44)

3.3 Age Among the patients, 213 individuals were under the age of 60, representing 30.00% of the total. Patients aged between 60 and 80 numbered 440, comprising 61.97%. Those over 80 years old totaled 57, accounting for 8.03% (Table 3).

Table 3 Age of OP patients

Year	Age// case		
	Under 60 years old	60 – 80 years old	Over 80 years old
2019	83	164	21
2020	63	128	23
2021	67	148	13
Total// case (%)	213 (30.00)	440 (61.97)	57 (8.03)

3.4 Brittle fracture The incidence of brittle fractures in patients was examined. A total of 28 cases of brittle fractures were

Table 5 TCM syndrome type of OP patients

Year	TCM syndrome type//case				
	Liver-kidney deficiency syndrome	Phlegm-stasis obstruction syndrome	Rheumatic obstruction syndrome	Damp-heat obstruction syndrome	Qi-yin deficiency syndrome
2019	110	65	32	23	18
2020	74	57	28	21	18
2021	85	48	28	26	23
Total//case (%)	369 (37.89)	170 (23.94)	88 (12.39)	70 (9.86)	59 (8.31)

3.7 Comorbidities A statistical analysis was performed on the comorbidities present in 710 OP patients. The findings indicated that the five most prevalent comorbidities were rheumatoid arthritis (RA), observed in 356 cases (50.14%); Sjogren’s syndrome (SS), identified in 104 cases (14.65%); osteoarthritis (OA), present in 99 cases (13.94%); ankylosing spondylitis (AS), found in 42 cases (5.92%); and gout reported in 36 cases (5.07%) (Table 6).

Table 6 Comorbidities of OP patients

Year	Comorbidities// case				
	RA	SS	OA	Gout	AS
2019	130	34	45	12	14
2020	111	34	29	12	12
2021	115	36	25	12	16
Total//case (%)	356 (50.04)	104 (14.65)	99 (13.94)	36 (5.07)	42 (5.92)

recorded over the study period, corresponding to an incidence rate of 3.94%. The primary fracture locations were the lumbar vertebrae and ribs. Specifically, 11 cases occurred in 2019, 5 cases in 2020, and 12 cases in 2021.

3.5 Treatment status Among 710 OP patients, 532 (74.93%) received calcium supplements. Vitamin D supplement was administered to 644 patients, representing 90.70% of the total. Bisphosphonate therapy was provided to 302 patients (42.54%), while 122 patients (17.18%) were treated with salmon calcitonin (Table 4).

Table 4 Treatment status of OP patients

Year	Treatment//case			
	Calcium supplement	Vitamin D	Bisphosphonate	Salmon calcitonin
2019	218	244	120	44
2020	136	186	83	43
2021	178	214	99	35
Total//case (%)	532 (74.93)	644 (90.70)	302 (42.54)	122 (17.18)

3.6 TCM syndrome type A statistical analysis was performed to examine the distribution of TCM syndrome types among 710 OP patients. The findings indicated that the predominant TCM syndrome was liver-kidney deficiency, with 369 cases representing 37.89% of the total. Additionally, 170 cases (23.94%) were identified as phlegm-stasis obstruction syndrome, 88 cases (12.39%) as rheumatic obstruction syndrome, 70 cases (9.86%) as damp-heat obstruction syndrome, and 59 cases (8.31%) as qi-yin deficiency syndrome (Table 5).

3.8 Gender and age of OP patients with comorbidities As shown in Table 7, regarding gender distribution, RA, SS, and OA combined with OP predominantly affected females, whereas gout and AS were more prevalent among males. Concerning age distribution, the majority of patients with most diseases were between 60 and 80 years old, while AS was primarily observed in individuals under 60 years old.

3.9 TCM syndrome type of OP patients with comorbidities The distribution of TCM syndrome types among OP patients with comorbidities exhibited distinct characteristics. For RA, the predominant syndrome types were liver-kidney deficiency syndrome and phlegm-stasis obstruction syndrome, followed by rheumatic obstruction syndrome and damp-heat obstruction syndrome. For SS, the primary syndromes included qi-yin deficiency syndrome,

Table 7 Gender and age of OP patients with comorbidities case

Comorbidities	Gender		Age		
	Male	Female	Under 60 years old	60 – 80 years old	Over 80 years old
RA	66	290	82	255	19
SS	4	100	37	61	6
OA	14	85	19	69	11
Gout	23	13	10	20	6
AS	24	18	32	10	0

followed by liver-kidney deficiency syndrome, phlegm-stasis

Table 8 TCM syndrome types of OP patients with comorbidities case

Comorbidities	TCM syndrome type						
	Liver-kidney deficiency syndrome	Phlegm-stasis obstruction syndrome	Rheumatic obstruction syndrome	Damp-heat obstruction syndrome	Qi-yin deficiency syndrome	Yin deficiency with blood stasis syndrome	Others
RA	143	142	41	21	6	3	
SS	20	16	2	2	54	8	2
OA	64	9	14	4	8	1	
Gout	4	17	1	18	2		
AS	20	12	4	6			

4 Discussion

OP is a metabolic disorder characterized by osteopenia, deterioration of bone microstructure, reduced bone strength, and an increased risk of fractures. The prevalence of OP among the elderly population in China progressively rises with advancing age^[2]. In this study, among OP inpatients, those diagnosed with RA, SS, and OA were predominantly females aged 60 to 80 years, whereas patients with gout were primarily males within the same age range. This distribution may reflect an age-related bias at the time of hospital admission. Conversely, patients with AS were mainly males under 60 years old, which aligns with the typical age of onset and gender distribution associated with this condition.

Rheumatic immune diseases concomitant with OP are highly prevalent. Patients with RA exhibit a greater susceptibility to OP compared to the general population, with its incidence being associated with factors such as patient age, disease duration, disease activity, and glucocorticoid usage^[3]. The pathogenesis of OP secondary to RA may involve dysregulation of inflammatory mediators, including the Wnt signaling pathway, the RANK/RANKL/OPG signaling pathway, and TNF- α ^[4]. The primary factors influencing OA and OP include age, gender, smoking, estrogen levels, and trauma. Among these, the timing of menopause and age are the principal risk factors for OP in patients with OA^[5], with the underlying mechanism potentially linked to subchondral bone resorption^[6]. Additionally, gout is considered a risk factor for OP, as the incidence of OP in patients with gout is significantly higher than in healthy individuals undergoing routine physical examinations^[7]. Patients with pSS complicated by renal tubular acidosis (RTA) exhibit a higher risk of fractures compared to individuals with pSS alone and healthy ones^[8]. OP can manifest in patients with AS during the early stages of the disease, with its de-

velopment closely associated with high disease activity, low body mass index (BMI), elevated levels of β -collagen-specific sequences, and reduced total 25-hydroxyvitamin D concentrations^[9]. Dysregulation of the RANKL/RANK/OPG signaling pathway and the Wnt pathway, along with abnormal cytokine profiles, are considered primary mechanisms underlying the pathogenesis of OP in patients with AS^[10].

obstruction syndrome, and yin deficiency with blood stasis syndrome. OA was mainly characterized by liver-kidney deficiency syndrome, with rheumatic obstruction syndrome, phlegm-stasis obstruction syndrome, and qi-yin deficiency syndrome occurring subsequently. In gout, the principal syndromes were damp-heat obstruction syndrome and phlegm-stasis obstruction syndrome, followed by liver-kidney deficiency syndrome. AS primarily presented with liver-kidney deficiency syndrome, followed by phlegm-stasis obstruction syndrome, damp-heat obstruction syndrome, and rheumatic obstruction syndrome (Table 8).

Studies have identified that the predominant TCM syndrome types associated with primary OP are spleen-kidney yang deficiency syndrome, followed by liver-kidney yin deficiency syndrome, qi stagnation and blood stasis syndrome, and insufficiency of qi-blood syndrome^[11]. In patients with AS, the severity of OP attributed to liver-kidney deficiency syndrome is significantly greater than that associated with damp-heat obstruction syndrome^[12]. Common TCM syndrome types observed in OP secondary to RA include liver-kidney deficiency syndrome, qi-blood deficiency syndrome, and phlegm-stasis obstruction syndrome. Notably, damp-heat obstruction syndrome is more prevalent in males, whereas liver-kidney deficiency syndrome and qi-blood deficiency syndrome are more frequently observed in females^[13]. Currently, there are no comprehensive studies examining the correlation between gout, SS, OA syndrome types, and OP. This study revealed that among gout patients with OP, the predominant syndrome types were damp-heat obstruction syndrome and phlegm-stasis obstruction syndrome. In SS patients with OP, the primary syndrome type was qi-yin deficiency syndrome, followed by liver-kidney deficiency syndrome and phlegm-stasis obstruction syndrome. OA patients with concurrent OP were mainly characterized by liver-kidney deficiency syndrome. Further research is warranted to explore these associations in greater depth.

Currently, the primary pharmacological treatments for OP in-

clude bone resorption inhibitors, bone formation stimulators, and dual-action agents that possess both therapeutic effects^[1]. In clinical practice at Wuxi Traditional Chinese Medicine Hospital, bisphosphonates and calcitonins were administered in a total of 424 cases, suggesting that treatment remains suboptimal for certain patients. It is imperative for clinicians to emphasize the standardized management of OP. Furthermore, the utilization of calcium supplements and vitamin D as part of basic treatment has not yet achieved comprehensive implementation. Moving forward, enhanced health management and therapeutic interventions should be prioritized for high-risk populations and diagnosed patients with OP.

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(From page 58)

group exhibited higher mastery rate of antithrombotic knowledge, greater adherence to both in-hospital and post-discharge rehabilitation training, improved compliance with recommended lifestyle behaviors, and increased patient satisfaction compared to the control group. These findings suggest that the implemented model effectively facilitates a transition from passive receipt of care to active patient engagement in management. Furthermore, the observation group achieved significantly higher Lysholm scores at one week and one month post-operation, alongside a notably lower incidence of DVT relative to the control group. These outcomes may be attributed to comprehensive interventions, including dynamic risk assessment, coordinated collaboration between physicians and nurses, standardized rehabilitation guidance, and sustained follow-up management after hospital discharge.

In conclusion, antithrombotic prevention management based on the 5A model incorporates risk assessment, health education, rehabilitation training, multidisciplinary collaboration, and continuous care into a comprehensive, closed-loop process. This approach enhances patients' knowledge of VTE prevention and treatment, improves rehabilitation adherence after ACL reconstruction, facilitates knee joint function recovery, reduces the risk of DVT, improves the quality of care, and increases patient satisfaction. Furthermore, it offers a valuable reference for clinical postopera-

tive antithrombotic prevention management.

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