Anti-osteoporosis Drugs Prescriptions Among Osteoporosis Patients with T2DM in China

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Mengyao XUE[a], Shuo ZHANG[a] ,Nan PENG[b], Guoxian LU[a], Ruolan WEI[a], Dongning YAO[a], Xiaoning HE[b]

a. School of Pharmacy, Nanjing Medical University, Nanjing, China

b. School of Pharmaceutical Science and Technology, Tianjin University, Tianjin, China

BACKGROUND

- Osteoporosis and type 2 diabetes mellitus (T2DM) are common chronic diseases in the elderly. The comorbidity rate of osteoporosis and T2DM in China is approximately 37.8%, significantly higher than the global average of 27.67%. Women, elderly individuals, those with a long disease course and poor glycemic control are at high risk, with a markedly elevated fracture risk.
- Current osteoporosis guidelines and real-world studies focus on single disease, lacking standardized strategies and systematic medication data for patients with osteoporosis complicated by T2DM. Systematic real-world data on the overall use of anti-osteoporosis medications in patients with osteoporosis complicated by T2DM remains scarce.

AIM

- This study aims to clarify the trends and prescription patterns of osteoporosis medications among osteoporosis with T2DM in China.

METHODS

STUDY DESIGN

- A retrospective cohort study using electronic medical records from a large healthcare platform in Eastern China was conducted.
- Index date: Date of the first prescription of the index anti-osteoporosis medication (AOM).
- Date of Admission: January 1, 2018, to October 31, 2025.

POPULATION

Inclusion Criteria:

- Patients diagnosed with osteoporosis and with at least one prescription record of AOM.

Exclusion Criteria:

- Paget's disease or malignant tumors.
- Incidence of type 1 diabetes mellitus, malnutrition-related diabetes mellitus, secondary diabetes mellitus, or gestational diabetes mellitus during the study period.
- Missing gender or date of birth data.
- Prescription of antidiabetic agents without a confirmed diagnosis of T2DM during the study period.

Group:

- Enrolled osteoporosis patients were divided into two groups based on whether they had a T2DM diagnosis prior to study enrollment.

Medication Utilization Rate and Prescription Rate:

- Medication utilization rate was defined as the ratio of patients receiving a specific AOM to those receiving any AOM within one year.
- Prescription rate was defined as the ratio of prescriptions containing a specific number of AOM categories to all AOM prescriptions within one year.

STATISTICAL ANALYSIS:

- Categorical variables were described as frequencies and constituent ratios, and the chi-square test was used to analyze the statistical significance of intergroup differences.
- Continuous variables were presented as mean ± standard deviation ; one-way analysis of variance (ANOVA) was applied for normally distributed continuous variables, while the Kruskal-Wallis test was used for non-normally distributed ones.
- The Cochran-Armitage trend test was adopted to analyze the linear trend of medication use over time.
- A two-tailed P-value < 0.05 was considered statistically significant.

RESULTS

Characteristics of the Study Population:

✓ A total of 657,132 osteoporosis patients were enrolled in this study, including 172,510 in the DM group and 484,622 in the non-DM group.

✓ Key differences in baseline characteristics:

- The mean age of the DM group (69.4) was significantly higher than that of the non-DM group (65.5).
- Compared with the non-DM group, patients in the DM group were older, had a higher proportion of males, a heavier burden of comorbidities such as cardiometabolic diseases, and showed differences in prior medication patterns, including anti-osteoporosis drugs and hypoglycemic agents.

Differences in AOMs Utilization Rates:

- Vitamin D analogs consistently remained the most commonly used class of anti-osteoporotic drugs in both groups each year(Table 1 & Figure 1), with utilization rates in the DM group significantly higher than those in the non-DM group at all time points (P < 0.001).
- Bisphosphonates also showed a notable decreasing trend in both groups (14.6% to 11.0% in the DM group and 29.8% to 14.0% in the non-DM group), with utilization rates in the DM group significantly lower than those in the non-DM group throughout the study period (P < 0.001).
- Following its approval for marketing in China in June 2020, the utilization rate of denosumab increased steadily, reaching 17.9% in the DM group and 26.4% in the non-DM group by 2025.

Differences in AOMs Prescription Rates:

- Monotherapy was the predominant prescription regimen in both groups (Figure 2);the monotherapy prescription rate in the DM group was consistently and significantly higher than that in the non-DM group.
- Among monotherapy prescriptions prescriptions in both groups, active vitamin D and its analogs accounted for the highest proportion, with a significantly higher rate in the DM group than in the non-DM group.
- In dual combination prescriptions, the most common combination in both groups was active vitamin D and its analogs plus bisphosphonates.

Table 1. Utilization rates of various AOMs by year, 2019–2025 (%)

	Year	Bisphosphonates	Denosumab	Calcitonin	MHT	SERMs	PTHa	VD	VK	TCM
2019	DM	14.6	0.0	4.6	0.5	0.0	0.0	93.5	0.5	7.3
	Non-DM	29.8	0.0	7.4	0.7	0.3	0.0	84.6	0.9	12.6
	P value	<0.001	-	<0.001	0.451	0.02	-	<0.001	0.12	<0.001
2020	DM	13.9	0.0	5.0	1.2	0.0	0.0	91.3	1.0	6.8
	Non-DM	24.9	0.0	8.3	1.5	0.2	0.0	84.1	1.2	10.9
	P value	<0.001	0.917	<0.001	0.012	0.001	-	<0.001	0.155	<0.001
2021	DM	13.1	1.4	5.3	1.2	0.0	0.0	90.2	1.3	5.6
	Non-DM	21.9	2.2	8.5	1.9	0.0	0.0	83.2	1.8	8.8
	P value	<0.001	<0.001	<0.001	<0.001	0.006	0.113	<0.001	<0.001	<0.001
2022	DM	13.5	5.2	5.4	1.2	0.0	0.0	86.7	1.7	6.1
	Non-DM	19.3	8.7	7.6	1.9	0.0	0.0	80.5	2.2	8.2
	P value	<0.001	<0.001	<0.001	<0.001	0.007	0.377	<0.001	<0.001	<0.001
2023	DM	12.8	9.8	6.3	1.3	0.0	0.0	81.5	1.9	6.8
	Non-DM	17.2	16.0	7.6	2.1	0.0	0.0	73.9	2.5	9.1
	P value	<0.001	<0.001	<0.001	<0.001	0.075	0.354	<0.001	<0.001	<0.001
2024	DM	11.9	14.9	6.5	1.2	0.0	0.1	77.4	1.6	7.8
	Non-DM	15.7	22.3	7.8	2.0	0.0	0.2	69.3	2.0	9.1
	P value	<0.001	<0.001	<0.001	<0.001	0.062	<0.001	<0.001	<0.001	<0.001
2025	DM	11.0	17.9	5.0	1.2	0.0	0.2	75.3	1.3	7.2
	Non-DM	14.0	26.4	6.0	2.0	0.0	0.3	66.3	1.6	8.8
	P value	<0.001	<0.001	<0.001	<0.001	0.118	<0.001	<0.001	<0.001	<0.001
P for trend in DM		<0.001	<0.001	0.553	0.678	<0.001	<0.001	<0.001	0.968	<0.001

Table 2. AOM prescription patterns by year, 2019–2025 (%)

	Year	Monotherapy	Dual combination	Triple combination	Quadruple combination
2019	DM	96.3	3.5	0.2	0.0
	Non-DM	85.8	13	1.1	0.0
	P	<0.001	<0.001	<0.001	0.173
2020	DM	96.4	3.5	0.1	0.0
	Non-DM	89.0	10.5	0.6	0.0
	P	<0.001	<0.001	<0.001	0.033
2021	DM	96.5	3.2	0.1	0.0
	Non-DM	90.6	9.1	0.4	0.0
	P	<0.001	<0.001	<0.001	0.671
2022	DM	96.4	3.5	0.1	0.0
	Non-DM	91.8	7.7	0.5	0.0
	P	<0.001	<0.001	<0.001	<0.001
2023	DM	96.3	3.5	0.2	0.0
	Non-DM	92.7	6.9	0.4	0.0
	P	<0.001	<0.001	<0.001	0.033
2024	DM	96.7	3.2	0.1	0.0
	Non-DM	93.1	6.6	0.3	0.0
	P	<0.001	<0.001	<0.001	0.606
2025	DM	96.8	3.1	0.1	0.0
	Non-DM	93.7	6.1	0.3	0.0
	P	<0.001	<0.001	<0.001	<0.001
P for trend in DM		<0.001	<0.001	0.018	0.238

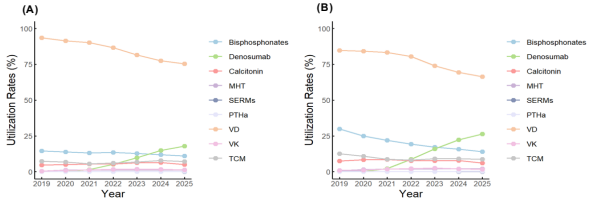

Figure 1. AOM utilization rates in (A) DM group; (B) non-DM group.

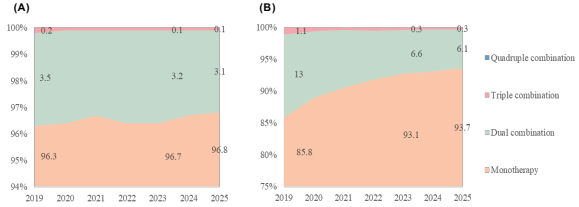

Figure 2. Prescription patterns of AOM in (A)DM group; (B) non-DM group.

CONCLUSION

This study reveals the prescription patterns of osteoporosis patients with T2DM. Compared with the non-DM group, DM patients were more inclined to monotherapy, among which active vitamin D and its analogs were most frequently used, with less utilization of other classes of anti-osteoporotic drugs.

Correspondence

Dongning Yao, Ph.D. Associate Professor

School of Pharmacy, Nanjing Medical University, Nanjing, China

E-mail: dnyao@njmu.edu.cn

Disclose

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