

早发性卵巢功能不全患者的骨密度 及骨质疏松认知状况调查

陈秀英[▲] 薛智云[▲] 赵素兰 欧阳怡彤 郭婷 顾超 李斌[△]

(复旦大学附属妇产科医院妇科 上海 200011)

【摘要】 目的 分析早发性卵巢功能不全(premature ovarian insufficiency, POI)患者的骨密度状况,调查骨质疏松症的发生率及骨质疏松认知状况。**方法** 纳入2022年1月至2024年6月在复旦大学附属妇产科医院就诊的POI患者,采用双能X射线吸收法(dual-energy X-ray absorptiometry, DXA)测量骨密度值,并对2024年就诊的POI患者进行问卷调查,通过骨质疏松知识评估工具(Osteoporosis Knowledge Assessment Tool, OKAT)评估POI患者对骨质疏松知识的掌握情况。**结果** 共纳入467例POI患者,其中骨质疏松症患者占12.85%,骨量减少者占49.46%。共收到有效调查问卷145份,研究对象的平均年龄为(33.62±5.23)岁,OKAT的平均得分为(7.83±3.80)分。基于OKAT得分评估骨质疏松认知水平,“一般”的占27.59%,“好”的仅占13.79%。回答准确率最高的题目是“骨质疏松症会增加骨折风险”,准确率为93.79%;回答准确率最低的题目是“骨质疏松症通常会在骨折前引起症状(如疼痛)”,准确率仅为1.38%。进一步分析发现,OKAT得分在不同的婚姻状态、教育水平、家庭年收入、维生素D补充、乳制品摄入以及门诊骨健康宣教中的差异存在统计学意义。**结论** POI患者骨量丢失现象严重,骨质疏松症发生率较高,骨质疏松知识缺乏且骨健康保护意识不足。

【关键词】 早发性卵巢功能不全(POI); 骨质疏松; 骨密度; 骨质疏松知识评估工具(OKAT)

【中图分类号】 R711.75, R589.9 **【文献标志码】** A **doi:**10.3969/j.issn.1672-8467.2026.04.004

Survey of bone mineral density and osteoporosis awareness in premature ovarian insufficiency patients

CHEN Xiu-ying[▲], XUE Zhi-yun[▲], ZHAO Su-lan, OUYANG Yi-tong,
GUO Ting, GU Chao, LI Bin[△]

(Department of Gynecology, Obstetrics and Gynecology Hospital, Fudan University, Shanghai 200011, China)

【Abstract】 Objective To investigate the status of bone health, the occurrence of osteoporosis and the knowledge and awareness levels of osteoporosis in premature ovarian insufficiency (POI) patients. **Methods** This study included patients with POI who visited Obstetrics and Gynecology Hospital, Fudan University between Jan 2022 and Jun 2024. Bone mineral density values were measured using dual-energy X-ray absorptiometry (DXA). Additionally, a questionnaire survey was conducted among POI patients who visited the hospital in 2024 to assess their knowledge and awareness levels of osteoporosis using the Osteoporosis Knowledge Assessment Tool (OKAT). **Results** A total of 467 patients with POI were included in this study, of whom 12.85% had osteoporosis and 49.46% had osteopenia. A total of 145 valid questionnaires were collected. The average age of the respondents was (33.62±5.23) years old, and the

国家自然科学基金(82271670);上海市自然科学基金(22ZR1408700)

[▲]CHEN Xiu-ying and XUE Zhi-yun contributed equally to this work

[△]Corresponding author E-mail: libin782@126.com

网络首发时间:2026-06-29 14:17:20 网络首发地址:https://link.cnki.net/urlid/31.1885.R.20260627.1830.002

average OKAT score was (7.83 ± 3.80) points. Based on the OKAT score, the knowledge and awareness levels of osteoporosis were evaluated, and 27.59% were rated as “average”, while only 13.79% were rated as “good”. The best answer accuracy was “osteoporosis leads to an increased risk of bone fracture”, with an accuracy of 93.79%; and the question with the worst accuracy was “osteoporosis usually causes symptoms (e.g., pain) before fractures occur” with only 1.38% accuracy. Further analysis revealed that the differences in OKAT scores across different marital status, educational levels, annual household incomes, vitamin D supplementation, dairy product intake, and outpatient bone health education were statistically significant. **Conclusion** POI patients experience significant bone loss and have a high occurrence of osteoporosis. However, they usually lack knowledge about osteoporosis and have inadequate awareness of bone health protection.

【Key words】 premature ovarian insufficiency (POI); osteoporosis; bone density; Osteoporosis Knowledge Assessment Tool (OKAT)

* This work was supported by the National Natural Science Foundation of China (82271670) and the Natural Science Foundation of Shanghai (22ZR1408700).

早发性卵巢功能不全 (premature ovarian insufficiency, POI) 是指女性在 40 岁之前出现的卵巢功能减退, 主要表现为月经异常、卵泡刺激素 (follicle stimulating hormone, FSH) >25 U/L 和雌激素水平波动性下降^[1]。近年来, POI 的患病率有上升趋势, 据报道约为 3.5%^[2]。尽管 POI 的病因和发病机制多种多样, 但这些致病因素都导致一个共同的变化, 即雌激素水平低下。雌激素对骨骼的生长和发育, 以及骨骼质量和结构的维持具有重要作用。长期雌激素缺乏导致的骨量丢失甚至骨质疏松是 POI 重要的远期并发症之一, 然而大多数女性骨质疏松的发生过程中多无症状, 直到发生脆性骨折。POI 患者发病年龄早, 与正常绝经女性相比, 雌激素缺乏时间更长, 其骨质疏松风险可能更高, 而该人群对骨质疏松的预防知识、潜在风险及健康管理的认知现状如何, 尚缺乏系统调查。本研究旨在调查分析 POI 患者的骨密度情况以及其对骨质疏松知识的掌握情况, 为提高医护人员对 POI 患者的骨健康评估以及 POI 患者的骨健康管理意识提供依据。

资料和方法

研究对象 研究对象为 2022 年 1 月至 2024 年 6 月在复旦大学附属妇产科医院就诊的 POI 患者。纳入标准: (1) 年龄 <40 岁; (2) 2 次 FSH >25 U/L

且检测时间间隔 >4 周; (3) 就诊期间在我院进行骨密度检测。排除标准: (1) 骨密度报告缺失; (2) 不具有完全行为能力, 因失明、失聪等无法完成调查; (3) 患有严重精神疾病; (4) 服用糖皮质激素; (5) 患有类风湿关节炎、成年成骨软化不全、未治疗的长期甲状腺功能亢进等慢性疾病。本研究得到复旦大学附属妇产科医院伦理委员会批准 (批准号: 2024-09), 研究对象均签署知情同意书。

问卷调查 通过查阅病史, 纳入明确诊断 POI 的患者, 收集骨密度检测报告。骨密度检测采用双能 X 射线吸收法 (dual-energy X-ray absorptiometry, DXA), 分别测量腰椎 (L1~L4) 和股骨颈的骨密度, T 值 >-1.0 为正常, T 值在 $-1.0 \sim -2.5$ 为骨质减少, T 值 <-2.5 为骨质疏松。同时对 2024 年就诊的 POI 患者发放调查表, 由经过统一培训的妇产科医师对受试者进行一对一面对面问卷调查, 耗时约 3 min。填写完毕后由调查员检查填写内容的完整性, 不准确或有缺项的问卷视为无效问卷, 予以排除。调查表由研究团队参照国内外文献以及研究现状设计, 共计 40 个问题, 包括 20 个一般信息和人口学特征问题和 20 个骨质疏松知识评估工具 (Osteoporosis Knowledge Assessment Tool, OKAT) 问题, 其中 OKAT 是从文献中引用并翻译的中文版^[3]。一般信息和人口学特征问题包括年龄、身高、体重、生育情况、婚姻状态、受教育水平、就业状态、家庭年收入、吸烟、饮酒、喝咖啡、锻炼、钙剂补充、维生素 D 补

充、乳制品摄入频率、日光照射、骨关节疼痛情况、父母骨折史、确诊POI时年龄和门诊骨健康知识宣教情况。

骨质疏松知识评估 OKAT问卷中问题1、2、8、9和11用于评估对骨质疏松症的认识;问题3、4、5、6、7、12和18用于评估对骨质疏松症危险因素的认识;问题10、13、14、15、16和17用于评估对骨质疏松症预防策略的了解,问题19和20用于评估骨质疏松症治疗的有效性。每个选择题都有3个选项(认同、不认同和我不知道)。未回答和回答“我不知道”视为回答错误。正确回答得1分,错误回答得0分。被调查者的总分乘以5倍:≤20分为很差,21~40分为差,41~60分为一般,61~80分为好,≥81分为很好。量表的Cronbach’s α系数为0.782,KMO值为0.780,Bartlett检验具有显著性($P<0.001$)。

统计学分析 应用SPSS 26.0软件进行统计学分析,符合正态分布的计量资料以 $\bar{x}\pm s$ 表示,不符合正态分布的计量资料以 $M(P_{25},P_{75})$ 表示,计数资料用 $n(\%)$ 表示;符合正态分布的数据,2组比较采用独立样本 t 检验,多组比较采用单因素方差分析,不符合正态分布的数据采用非参数检验,比较不同人口学特征的POI患者OKAT得分情况,分析影响得分的可能因素。 $P<0.05$ 为差异有统计学意义。

表1 POI患者的OKAT量表得分情况
Tab 1 OKAT item subscales of OPI patients

OKAT item subscales	Range	Average score
Knowledge of osteoporosis (Q 1, 2, 8, 9, 11)	0-5	2.30 ± 1.02
Awareness of osteoporosis risk factors (Q 3-7, 12, 18)	0-7	2.78 ± 1.80
Knowledge of osteoporosis preventive strategies (Q 10, 13-17)	0-6	2.26 ± 1.43
Assessment of treatment's availability (Q 19, 20)	0-2	0.48 ± 0.64
Total score (Q 1-20)	0-20	7.83 ± 3.80

POI患者骨质疏松知识的影响因素 如表3所示,OKAT得分在不同的婚姻状态、教育水平、家庭年收入、维生素D补充、乳制品摄入以及门诊骨健康宣教中的差异存在统计学意义。进一步分析组间差异发现,离异者OKAT得分明显低于已婚者和单身者;研究生及以上教育水平者OKAT得分明显高于其他学历者;家庭年收入>30万元者OKAT得分明显高于家庭年收入<15万元者;经常补充维生素D者OKAT得分明显高于不补充和偶尔补充维生素D者;乳制品摄入频率1~3次/月者OKAT得分明

结 果

POI患者骨量丢失情况 本研究共纳入467例POI患者,其中骨质疏松症患者占12.85%,骨量减少者占49.46%。年龄<30岁的POI患者130例,其中骨质疏松症患者占21.54%,骨量减少者占51.54%;年龄为30~39岁的POI患者337例,其中骨质疏松症患者占9.5%,骨量减少者占48.66%。

骨质疏松知识掌握情况 共回收有效问卷145份,调查对象的平均年龄为(33.62 ± 5.23)岁,确诊POI的年龄为(30.00 ± 7.51)岁,病程为(4.16 ± 3.73)年,其中55.17%的POI患者未生育。OKAT平均得分为(7.83 ± 3.80)分(表1),基于OKAT得分评估骨质疏松认识水平,“一般”占27.59%，“好”仅占13.79%，“较差”占36.55%，“非常差”占22.07%。如表2所示,回答准确率最高的题目是“骨质疏松症会增加骨折风险”,准确率为93.79%;其次是“到80岁时,大多数女性都有骨质疏松症”,准确率为80.69%。回答准确率最低的题目是“骨质疏松症通常会在骨折前引起症状(如疼痛)”,准确率为1.38%;其次是“与其他种族相比,白人女性发生骨折的风险最高”和“在绝经期开始后的十年里,有少量的骨质流失”,准确率分别为9.66%和10.34%。

显低于其他摄入频率者;接受过门诊骨健康宣教者OKAT得分明显高于未接受宣教者。此外,经常补充钙剂者OKAT得分高于不补充或偶尔补充钙剂者,但差异无统计学意义。

讨 论

过早的低雌激素状态可导致女性多系统并发症,相比正常绝经女性,POI患者的骨质疏松症、心血管疾病以及认知功能减退风险更大^[4]。POI患者

表2 OKAT 条目准确率

Tab 2 Accuracy rate of OKAT items

[n (%)]

No.	OKAT item	Correct answer	Case
1	Osteoporosis leads to an increased risk of bone fracture	True	136 (93.79)
2	Osteoporosis usually causes symptoms (e.g., pain) before fractures occur	False	2 (1.38)
3	Having a higher peak bone mass at the end of childhood gives no protection against the development of osteoporosis in later life	False	46 (31.72)
4	Osteoporosis is more common in men	False	71 (48.97)
5	Cigarette smoking can contribute to osteoporosis	True	65 (44.83)
6	White women are at highest risk of fracture as compared to other races	True	14 (9.66)
7	A fall is just as important as low bone strength in causing fractures	True	101 (69.66)
8	By age 80, the majority of women have osteoporosis	True	117 (80.69)
9	From age 50, most women can expect at least one fracture before they die	True	33 (22.76)
10	Any type of physical activity is beneficial for osteoporosis	False	56 (38.62)
11	It is easy to tell whether I am at risk of osteoporosis by my clinical risk factors	True	46 (31.72)
12	Family history of osteoporosis strongly predisposes a person to develop osteoporosis	True	91 (62.76)
13	An adequate calcium intake can be achieved from two glasses of milk a day	True	38 (26.21)
14	Sardines and broccoli are good sources of calcium for people who cannot take dairy products	True	51 (35.71)
15	Calcium supplements alone can prevent bone loss	False	80 (55.17)
16	Alcohol in moderation has little effect on osteoporosis	True	29 (20.00)
17	A high salt intake is a risk factor for osteoporosis	True	74 (51.03)
18	There is a small amount of bone loss in the ten years following the onset of menopause	False	15 (10.34)
19	Hormone therapy prevents further bone loss at any age after menopause	True	52 (35.86)
20	There are no effective treatments for osteoporosis available in China	False	18 (12.41)

表3 145例OPI患者人口学特征及骨质疏松知识得分比较

Tab 3 Comparison of demographic characteristics and osteoporosis knowledge scores among 145 OPI patients

[n (%) or $\bar{x} \pm s$]

Variable	Case	OKAT score	P
Age (y)			
<30	32 (22.07)	8.00 $\pm$ 4.56	0.801
30-39	113 (77.93)	7.78 $\pm$ 3.58	
Maternity			1.000
Yes	65 (44.83)	7.80 $\pm$ 3.87	0.036
No	80 (55.17)	7.86 $\pm$ 3.75	
Marital status			
Single	38 (26.21)	8.42 $\pm$ 4.14	
Married	100 (68.97)	7.84 $\pm$ 3.64	0.005
Divorced	7 (4.82)	4.43 $\pm$ 2.76	
Widow	0	-	
Education			
Primary school or below	2 (1.38)	3.00 $\pm$ 0.00	0.005
Secondary school	11 (7.59)	6.00 $\pm$ 4.07	
Junior college or university	107 (73.79)	7.65 $\pm$ 3.62	
Postgraduate degree or higher	25 (17.24)	9.76 $\pm$ 3.82	

(续表 3)

Variable	Case	OKAT score	P
Employment			0.459
Student	5 (3.45)	6.00 $\pm$ 5.79	0.021
Employed	131 (90.34)	7.95 $\pm$ 3.75	
Unemployed	9 (6.21)	7.11 $\pm$ 3.48	
Annual household income (Yuan)			
<150 000	49 (33.79)	6.96 $\pm$ 4.18	0.230
150 000-300 000	54 (37.24)	7.54 $\pm$ 3.22	
>300 000	42 (28.97)	9.21 $\pm$ 3.74	
Smoking			
No	140 (96.55)	7.93 $\pm$ 3.79	0.700
Occasionally	2 (1.38)	4.50 $\pm$ 2.12	
Often	3 (2.07)	5.33 $\pm$ 4.51	
Drinking alcohol			
No	112 (77.24)	7.83 $\pm$ 3.78	0.199
Occasionally	32 (22.07)	7.91 $\pm$ 3.99	
Often	1 (0.69)	5.00 $\pm$ 0.00	
Drinking coffee			
No	46 (31.72)	7.37 $\pm$ 3.77	0.199
Occasionally	74 (51.03)	7.69 $\pm$ 3.63	
Often	25 (17.24)	9.08 $\pm$ 4.24	

(续表 3)

Variable	Case	OKAT score	P
Exercise			0.093
No	44 (30.34)	7.07 ± 3.82	
Not regular exercise	83 (57.24)	8.41 ± 3.77	
Regular exercise	18 (12.41)	7.00 ± 3.63	
Calcium supplement			0.056
No	64 (44.14)	7.27 ± 3.82	
Occasionally	61 (42.07)	7.84 ± 3.84	
Often	20 (13.79)	9.60 ± 3.82	
Vitamin D supplement			0.010
No	84 (57.93)	7.24 ± 3.62	
Occasionally	47 (32.41)	8.04 ± 3.77	
Often	14 (9.66)	10.64 ± 3.93	
Drinking milk			<0.001
No	16 (11.03)	8.56 ± 4.37	
1-3 times/mo	57 (39.31)	6.35 ± 3.73	
1-6 times/wk	61 (42.07)	8.51 ± 3.33	
1-3 times/d	11 (7.59)	10.64 ± 3.23	
Sunbathe			0.063
No	29 (20.00)	6.34 ± 3.59	
Occasionally	87 (60.00)	8.20 ± 3.70	
Often	29 (20.00)	8.21 ± 4.06	
Bone and joint pain			0.838
No	81 (55.86)	7.79 ± 3.71	
Occasionally	58 (40.00)	7.97 ± 3.99	
Often	6 (4.14)	7.00 ± 3.74	
Family history of bone fracture			0.574
Yes	18 (12.41)	8.44 ± 4.03	
No	127 (87.59)	7.74 ± 3.78	
Bone health education in the outpatient			0.040
Yes	96 (66.21)	8.32 ± 3.86	
No	49 (33.79)	6.86 ± 3.52	

骨质疏松症及其相关骨折的报告率不断升高,而骨质流失通常没有症状,因此在POI患者的长期管理中应重视骨健康问题,指南建议在初始诊断时就应考虑测量骨密度^[5]。骨密度测定有助于早期发现存在骨量减少及骨质疏松的POI患者,以降低骨折风险。尽管骨密度T评分诊断骨质疏松症通常需骨量达到峰值后才能使用,但考虑POI的特殊性,指南仍认为可使用T<2.5作为POI患者骨质疏松症的诊断^[5-6]。我院临床数据显示,POI患者中骨质疏松症的发生率高达12.85%,且年龄<30岁的患者比30~39岁的患者骨量减少和骨质疏松发生率更

高(21.54% vs. 9.50%),这可能与患者机体尚未达到骨密度峰值时即发生骨量丢失有关。POI发病年龄会影响骨骼生长轨迹,导致峰值骨量积累不足,或巩固期缩短并出现早发性骨质流失^[7]。较低的峰值骨量和较早的骨质流失使POI患者骨密度较低,骨折风险相应增加^[8]。

POI患者骨密度降低与雌激素缺乏的程度和持续时间有关。各指南一致建议,若无禁忌证,POI患者均应给予激素补充治疗(hormone replacement therapy, HRT),并持续到至少正常绝经年龄^[1,6,9]。HRT不仅可以缓解POI患者的低雌激素症状,而且对远期的心血管疾病和骨质疏松可起到预防作用。国际更年期协会2020年的POI白皮书还指出^[6],POI患者低骨密度的危险因素包括发病年龄<20岁、POI的诊断延迟1年以上、未定期接受HRT、血清维生素D浓度低、低钙饮食以及缺乏锻炼等。锻炼、钙剂和维生素D补充是预防骨质疏松的重要手段。本研究发现规律锻炼、经常补充钙剂和维生素D的比例分别为12.41%、13.79%和9.66%,可见POI患者对骨质疏松危险因素的预防意识较为薄弱。

POI患者对骨质疏松知识的了解不够全面。澳大利亚一项对316例POI/早绝经(early menopause, EM)患者的调查报告显示,OKAT平均得分为8分^[10]。本研究中,OKAT平均得分仅为7.83分,基于OKAT得分进行骨质疏松知识和认识水平评估,“一般”占27.59%，“好”仅占13.79%。对骨质疏松知识了解不足会对骨健康相关行为产生负面影响。有研究报道,骨质疏松知识得分可能与年龄呈负相关,与受教育程度呈正相关^[11];而农村或偏远地区女性的OKAT得分显著低于城市女性^[12]。调查发现,OKAT得分在婚姻状态、教育水平、家庭年收入、维生素D补充、乳制品摄入以及门诊骨健康宣教方面存在差异。学历水平和家庭收入较高者、经常补充维生素D和钙剂的POI患者OKAT得分均相对更高,但差异无统计学意义。不同的人口学特征可能会影响骨质疏松知识的主动获取,知识水平更高的患者在骨健康行为上的表现可能更佳,但需要扩大样本量深入分析。离异状态的调查对象,其OKAT得分明显低于已婚和单身的调查对象,但受限于样本量较小,还有待扩大样本量证实。总体上,POI患者对骨质疏松的了解仍存在很大不足,门

诊骨健康宣教对提高患者的骨质疏松认知十分必要。

医务人员对POI患者骨质疏松症的认识程度亦不相同。80%以上的全科医师认为有必要更多了解POI合并骨质疏松症,但仅有不到50%的临床医师对POI患者进行常规骨密度测定^[12]。提高临床医师和患者对骨健康的认识具有重要意义。

本研究回顾性分析了467例POI患者的骨密度检测情况,分析了不同年龄段POI患者中骨量减少和骨质疏松症的占比,并通过OKAT对145例POI患者的骨质疏松认知情况进行评估,提示加强科普宣教、筛查和监测POI患者的骨健康、促进HRT实施和坚持的重要性。本研究的问卷样本量相对较小,代表性不足,部分问卷内容由患者自报,存在一定主观性,可能会造成偏倚。未来可通过扩大样本量以及多中心调查研究系统分析POI患者的骨健康现状和骨质疏松症发生情况,并进一步完善调查问卷,通过多元分析方法分析影响骨质疏松认知情况的因素。

作者贡献声明 陈秀英 研究设计,论文撰写,问卷调查,统计分析。薛智云 问卷调查,数据整理,统计分析。赵素兰 数据收集。欧阳怡彤 问卷调查。郭婷 问卷质控,统计指导。顾超 问卷设计,论文指导。李斌 研究指导,经费支持,论文指导。

利益冲突声明 所有作者均声明不存在利益冲突。

参 考 文 献

- [1] 中华医学会妇产科学分会绝经学组.早发性卵巢功能不全的临床诊疗专家共识(2023版)[J].中华妇产科杂志,2023,58(10):721-728.
- [2] Li M, Zhu Y, Wei J, et al. The global prevalence of premature ovarian insufficiency: a systematic review and meta-analysis[J].*Climacteric*,2023,26(2):95-102.
- [3] Abu Khurmah MH, Alkhatatbeh MJ, Alshogran OY.

Assessment of osteoporosis knowledge, awareness, and risk factors among premenopausal and postmenopausal women from Jordan: a cross-sectional study [J]. *Arch Osteoporos*,2023,18(1):121.

- [4] Xu XL, Mark J, Mishra GD. Age at natural menopause and development of chronic conditions and multimorbidity: results from an Australian prospective cohort [J]. *Hum Reprod*,2020,35(1):203-211.
- [5] European Society for Human Reproduction and Embryology (ESHRE) Guideline Group on POI, Webber L, Davies M, et al. ESHRE Guideline: management of women with premature ovarian insufficiency [J]. *Hum Reprod*,2016,31(5):926-937.
- [6] Panay N, Anderson RA, Nappi RE, et al. Premature ovarian insufficiency: an International Menopause Society White Paper[J].*Climacteric*,2020,23(5):426-446.
- [7] Manolagas SC, O'Brien CA, Almeida M. The role of estrogen and androgen receptors in bone health and disease [J].*Nat Rev Endocrinol*,2013,9(12):699-712.
- [8] Jones AR, Enticott J, Ebeling PR, et al. Bone health in women with premature ovarian insufficiency/early menopause: a 23-year longitudinal analysis [J]. *Hum Reprod*,2024,39(5):1013-1022.
- [9] "The Hormone Therapy Position Statement of the North American Menopause Society" Advisory Panel. The 2022 hormone therapy position statement of the North American Menopause Society[J].*Menopause*,2022,29(7):767-794.
- [10] Goh M, Nguyen HH, Khan NN, et al. Identifying and addressing osteoporosis knowledge gaps in women with premature ovarian insufficiency and early menopause: a mixed-methods study[J].*Clin Endocrinol (Oxf)*,2019,91(4):498-507.
- [11] Tabor E, Grodzki A, Pluskiewicz W. Higher education and better knowledge of osteoporosis improve bone health in Polish postmenopausal women[J].*Endokrynol Pol*,2022,73(5):831-836.
- [12] Jones AR, Goh M, Langham R, et al. Osteoporosis and premature ovarian insufficiency: geographic variation in clinicians' and consumers' knowledge gaps and barriers to care[J].*Arch Osteoporos*,2020,15(1):38.

(收稿日期:2025-01-09;编辑:段佳)