

济南市城区健康老年男性骨密度分析

康东红^{1*} 王燕² 张洪美¹ 刘涛¹ 冯潇雨¹ 曹维¹ 王萍¹

- 1. 山东大学附属千佛山医院内分泌科, 济南 250014
- 2. 泰山医学院附属医院内分泌科, 泰安 271000

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摘要: **目的** 探讨济南城区健康老年男性骨密度的变化规律, 为防治男性骨质疏松提供依据。 **方法** 于 2010 年, 随机抽取本院所管辖的 3 个社区, 再随机抽取 963 名健康成年男性作为研究对象, 年龄 40 ~ 90 岁, 平均年龄 (61.3 ± 13.6) 岁。采用双能 X 线骨密度测量仪 (GE Lunar DPX-NT, USA) 检测腰椎 1 至 4 联合值、股骨颈、全股骨、桡骨远端和桡尺骨全部的骨密度。 **结果** (1) 40 岁以后腰椎、股骨及前臂骨密度缓慢下降, 70 至 74 岁, 股骨颈及桡骨远端骨密度明显降低, 与 65 至 69 岁比较, 差异有显著性 ($P < 0.05$)。 (2) 股骨颈、股骨全部、桡骨远端、桡尺骨全部骨密度累积丢失率为 18.71%、14.80%、20.95%、25.68%。 (3) 70 至 79 岁骨质疏松和骨量减少的发生率为 29.1% 和 45.3%, 80 至 90 岁为 50.0% 和 32.4%。 **结论** 男性在 70 至 74 岁骨丢失加速, 70 岁以后骨质疏松发生率明显上升。

关键词: 老年; 男性; 骨密度

Analysis of bone mineral density in the elderly men in Jinan

KANG Donghong¹, WANG Yan², ZHANG Hongmei¹, LIU Tao¹, FENG Xiaoyu¹, CAO Wei¹, WANG Ping¹

- 1. Department of Endocrinology, Qianfoshan Hospital Affiliated to Shandong University, Jinan 250014
- 2. Department of Endocrinology, the Affiliated Hospital of Taishan Medical College, Taian 271000, China

Corresponding author: KANG Donghong, Email: kdh_2010@163.com

Abstract: **Objective** To investigate the changing pattern of bone mineral density (BMD) in the elderly men in Jinan, in order to provide basis for the prevention and treatment of osteoporosis. **Methods** Three communities under the administration of Qianfoshan Hospital were randomly selected in 2010. Then 963 healthy men were randomly selected in these 3 communities, from 40 to 90 years old, with an average age of 61.3 ± 13.6 years old. BMD of the lumbar vertebrae (L1-4), the femoral neck, the total femur, the radius distal, and the total radius and the ulna was detected using dual-energy X-ray absorptiometry (DEXA, Lunar DPX-NT, GE, USA). **Results** When above 40 years old, BMD of the lumbar vertebrae, the femur, and the radius and the ulna decreased gradually. While at the age of 70-74 years old, BMD of the femoral neck and the radius distal decreased rapidly. The cumulative loss rate of BMD of the femoral neck, the total femur, the radius distal, and the total radius and the ulna was 18.71%, 14.80%, 20.95%, and 25.68%, respectively. The incidence of osteoporosis and bone mass loss in subjects between 70 and 79 years old was 29.1% and 45.3%, respectively. The rate in subjects between 80 and 89 years was 50.0% and 32.4%, respectively. **Conclusion** Bone mass loss is accelerated in men between 70 and 74 years old. The incidence of osteoporosis increased significantly in men over 70 years old.

Key words: Elderly; Men; Bone mineral density

随着社会老龄化进展, 骨质疏松骨折将会给家庭和社会带来极大的负担。国内外对女性骨质疏松研究较多, 但近年男性骨质疏松引起人们的关注, 这是因为男性因骨质疏松导致骨折的发病率及死亡率

较高, 医疗花费也较大^[1-3], 全世界 1/3 髌部骨折发生在男性^[4], 而 80 岁后髌部骨折发病约为 50%^[6], 且当年死亡率为 37.5%^[5], 这一连串的数据表明, 防治男性骨质疏松刻不容缓。

要研究骨质疏松, 必须了解其骨骼衰老的规律。一般情况下, 人体在 40 岁之前骨量达峰值, 以后随着年龄的增加骨量逐渐丢失^[7], 不同的骨骼部位骨丢失的速率不完全一致, 且受诸多因素的影响, 在这

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* 通讯作者: 康东红, Email: kdh_2010@163.com。

一领域,国内外对女性研究比较多,对于男性相对较少^[8]。由于男性和女性的生理变化不同,在骨骼的衰老过程中必然存在差异。为探究老年男性骨质疏松的特点,我们选择济南市城区的一组人群进行了相关研究。

1 材料和方法

1.1 对象

于 2010 年,随机抽取本院所管辖的 3 个社区,再随机抽取 963 名健康成年男性作为研究对象,年龄(40~90)岁,平均年龄(61.3 ± 13.6)岁,均为汉族人,在济南市居住超过 15 年以上。受试对象按每 5 岁为一年龄段进行分组:(40~44.9),(45~49.9),(50~54.9),(55~59.9),(60~64.9),(65~69.9),(70~74.9),(75~79.9),(80~84.9),(85~90)岁。入组对象均签署知情同意书。纳入标准:身体健康状况良好或有基础疾病但病情稳定者,血常规、尿常规、肝功能、肾功能正常,自愿接受 DXA 进行 BMD 测定。排除标准:影响骨代谢的先天性代谢疾病,服用过可影响骨代谢的药物(糖皮质激素、雌激素、甲状腺激素、甲状旁腺激素、降钙素、双膦酸盐等),健美运动员,睾丸切除术史。

1.2 方法

采用美国 Lunar 公司生产的 DPX-NT DXA 扫描前后腰椎、左股骨、左前臂的感兴趣区(region of interest, ROI)的 BMD,具体检测指标为第 1 至第 4 腰椎 BMD 的联合值 L₁₋₄ BMD),股骨颈(Femoral neck)、全股骨(Total femur)的 BMD、挠骨远端(Radius-distal)、挠尺骨全部(Total Radius and Ulna)的 BMD。L₁₋₄、Femoral neck、Total femur、Radius-distal 及 Total Radius and Ulna 部位的精确度 0.5%~0.75%。

受试者脱鞋、免冠、穿室内单衣,使用体重秤测量体重(kg),最小测量标准是 0.1kg。使用校正的测距仪测量身高(cm),最小测量标准是 0.1cm。体重指数(kg/m²)=体重(kg)/身高(m)的平方。骨密度累计丢失率(%)=(骨量峰值-年龄段的骨密度)/骨量峰值。骨量峰值采用的本实验室建立的数据(15 至 55 岁的健康男性 2000 人)。依据中国人骨质疏松症诊断标准确诊骨质疏松及骨量减少^[9],计算其发生率。

1.3 统计学处理

利用 SPSS 13.0 统计软件包对各组实验数据进行处理,数据用均数 ± 标准差($\bar{x} \pm s$)表示。采用方

差分析比较不同年龄段各个部位骨密度值。 $P < 0.05$ 有统计学意义。

2 结果

2.1 一般资料(表 1)

受试对象平均身高、体重、体重指数分别为(169.1 ± 6.4) cm、(74.0 ± 12.0) kg、(26.22 ± 3.5) kg/m²。随着年龄的增长,身高、体重及体重指数逐渐降低。

表 1 受试对象的一般资料
Table 1 The general information of the subjects

	n	Age (yr)	Height(cm)	Weigh(kg)	Body Mass Index (kg/m ²)
40~44.9	107	42.7 ± 1.4	171.4 ± 5.8	78.4 ± 10.5	26.65 ± 3.1
45~49.9	107	47.4 ± 1.5	171.0 ± 6.1	78.9 ± 11.6	26.95 ± 3.6
50~54.9	104	52.4 ± 1.4	171.3 ± 5.9	78.9 ± 12.0	26.84 ± 3.4
55~59.9	109	57.4 ± 1.6	169.5 ± 6.1	76.3 ± 11.1	26.56 ± 3.5
60~64.9	90	62.2 ± 1.5	169.5 ± 6.3	76.2 ± 11.2	26.51 ± 3.6
65~69.9	81	67.6 ± 1.5	169.3 ± 6.5	74.4 ± 13.9	25.89 ± 4.0
70~74.9	105	72.7 ± 1.5	166.8 ± 6.1	70.7 ± 10.3	25.43 ± 3.6
75~79.9	114	77.2 ± 1.5	166.7 ± 5.9	71.4 ± 10.2	25.64 ± 3.6
80~84.9	87	82.0 ± 1.4	165.8 ± 6.2	69.4 ± 11.2	25.21 ± 3.6
85~90	59	87.0 ± 2.2	163.5 ± 4.6	65.7 ± 9.9	24.62 ± 3.8
total	963	61.3 ± 13.6	169.1 ± 6.4	74.0 ± 12.0	26.22 ± 3.5

2.2 老年男性腰椎、股骨、前臂的骨密度及其丢失率(表 2、表 3)

40 岁以后 L₁₋₄ BMD 缓慢下降,但在 80 岁以后 L₁₋₄ BMD 又呈现上升趋势,组间比较,差异有显著性($F = 2.82, P < 0.01$)。

Femoral neck BMD、Total femur BMD、Radius-distal BMD、Total Radius and Ulna BMD 逐渐减低,组间比较,差异有显著性($F = 18.34、12.89、13.27、19.98, P < 0.01$)。70 至 74 岁,Femoral neck BMD、Radius-distal BMD、Total Radius and Ulna BMD 快速减低,与 65 至 69 岁的骨密度比较,差异有显著性($P < 0.05$)。

80 至 84 岁的 Femoral neck BMD 和 Total femur BMD 累积丢失率为 18.71% 和 14.8%。85 至 90 岁,Radius-distal BMD 和 Total Radius and Ulna BMD 累积丢失率为 20.95% 和 25.68%。

2.3 老年男性骨量减少和骨质疏松的发生率(表 4)

70 岁以后,男性骨量减少和骨质疏松发生率显著上升。70 至 79 岁,依据 L₁₋₄ site BMD, Femoral neck site BMD, Total femur site BMD, Radius-distal BMD, Total Radius and Ulna BMD, Any one of them

site BMD 诊断骨质疏松和骨量减少的发生率分别为 80 至 90 岁分别为 14.7%、26.8%、23.5%、47.1%、9.3%、39.5%、9.3%、48.8%、5.8%、39.5%、17.6%、38.2%、41.2%、20.5%、38.2%、23.5%、20.9%、19.7%、16.3%、24.4%、29.1%、45.3%。50.0%、32.4%。

表 2 男性各年龄段腰椎、股骨、前臂骨密度

Table 2 BMD of the lumbar vertebrae, the femur, and the radius and the ulna in men in different groups

Age(yr)	n	BMD(g/cm ²)				
		L ₁₋₄	Femoral neck	Total femur	Radius-distal	Total Radius and Ulna
40 ~ 44.9	107	1.106 ± 0.159	0.993 ± 0.145	1.057 ± 0.141	0.774 ± 0.082	0.619 ± 0.068
45 ~ 49.9	107	1.055 ± 0.163	0.963 ± 0.134	1.025 ± 0.147	0.754 ± 0.079	0.606 ± 0.072
50 ~ 54.9	104	1.068 ± 0.158	0.969 ± 0.125	1.036 ± 0.131	0.753 ± 0.077	0.591 ± 0.068
55 ~ 59.9	109	1.108 ± 0.169	0.952 ± 0.119	1.016 ± 0.125	0.726 ± 0.074	0.578 ± 0.070
60 ~ 64.9	90	1.164 ± 0.193	0.934 ± 0.134	1.018 ± 0.148	0.742 ± 0.084	0.587 ± 0.072
65 ~ 69.9	81	1.099 ± 0.165	0.905 ± 0.112	0.984 ± 0.134	0.719 ± 0.065	0.560 ± 0.059
70 ~ 74.9	105	1.070 ± 0.205	0.853 ± 0.134■	0.943 ± 0.146	0.688 ± 0.094■	0.528 ± 0.082■
75 ~ 79.9	114	1.086 ± 0.174	0.849 ± 0.139	0.923 ± 0.144	0.670 ± 0.083	0.514 ± 0.069
80 ~ 84.9	87	1.125 ± 0.227	0.834 ± 0.147	0.904 ± 0.167	0.661 ± 0.108	0.498 ± 0.087
85 ~ 90	59	1.154 ± 0.217	0.846 ± 0.161	0.941 ± 0.178	0.626 ± 0.083	0.466 ± 0.075
total	963	1.098 ± 0.183	0.922 ± 0.144	0.994 ± 0.150	0.713 ± 0.084	0.556 ± 0.084
F		2.82	18.34	12.89	13.27	19.98
p		p < 0.01	p < 0.01	p < 0.01	p < 0.01	p < 0.01

注:与前一年龄段 BMD 相比,■P < 0.05

表 3 腰椎、股骨、前臂骨密度累计丢失率(%)

Table 3 The cumulative loss rate of BMD of the lumbar vertebrae, the femur, the radius, and the ulna (%)

Age(yr)	N	L1-4	Femoral neck	Total femur	Radius-distal	Total Radius and Ulna
40 ~ 44.9	107	1.33	3.21	0.38	2.27	1.28
45 ~ 49.9	107	5.89	6.14	3.39	4.79	3.34
50 ~ 54.9	104	4.72	5.56	2.36	4.92	5.74
55 ~ 59.9	109	1.16	7.21	4.24	8.33	7.81
60 ~ 64.9	90	-3.83	8.97	4.05	6.31	6.38
65 ~ 69.9	81	1.96	11.79	7.26	9.21	10.69
70 ~ 74.9	105	1.07	16.86■	11.12	13.13■	15.79■
75 ~ 79.9	114	3.12	17.25	13.0	15.40	18.02
80 ~ 84.9	87	-0.35	18.71	14.8	16.54	20.57
85 ~ 90	59	-2.94	17.54	11.31	20.95	25.68

注:累积下降率为本年龄段 BMD 较同部位骨量峰值减少的百分率;为本年龄组 BMD 与前一年龄段相比,■P < 0.05

表 4 根据不同骨骼部位的骨密度值诊断骨量减少和骨质疏松的发生率(%)

Table 4 The incidence of osteoporosis and bone mass loss according to BMD of different sites

	T score ≤ -2.5 (%)				-2.5 < T score < -1 (%)					
	50 and above(n = 640)		50 ~ 59(n = 160)		60 ~ 69(n = 160)		70 ~ 79(n = 160)		80 and above(n = 160)	
L ₁₋₄ site BMD	8.9	11.1	12.7	41.5	8.3	28.5	9.3	39.5	14.7	26.8
Femoral neck site BMD	6.8	38.7	2.5	27.9	3.5	40.4	9.3	48.8	23.5	47.1
Total femur site BMD	4.0	30.7	0.0	26.2	3.4	25.0	5.8	39.5	17.6	38.2
Radius-distal site BMD	13.9	17.0	5.9	16.9	7.1	13.1	20.9	19.7	41.2	20.5
Total Radius and Ulna site BMD	11.8	19.2	5.9	14.4	4.8	19.0	16.3	24.4	38.2	23.5
Any one of them site BMD	19.8	45.8	14.4	45.7	11.9	48.8	29.1	45.3	50.0	32.4

3 讨论

山东省老年人口列全国首位,在 3 个社区随机筛选 40 至 90 岁的健康男性 963 人作为研究对象,

具有很好的代表性。随年龄的增长男性身高、体重及体重指数逐渐降低,84 至 90 岁老年人较 40 至 45 岁的中年人身高减低 7 cm,体重减轻 6 kg,符合老年人生理变化的规律。

40 岁以后,男性骨密度呈下降趋势。40 至 70 岁,股骨骨密度处在缓慢下降,但在 70 至 75 岁,股骨颈骨密度快速降低,骨量丢失加速,80 至 85 岁以后,骨密度累计丢失率股骨颈为 18.71%,全股骨 14.8%。骨密度与性激素有关,性激素水平低下是男性骨质疏松症的主要病因^[10],但是男性骨密度减低与女性有所区别。冯报道^[11]女性在 50 至 55 岁,骨密度进入快速下降期,与女性卵巢衰老进入绝经期雌激素水平骤然下降有关,而男子睾丸衰老是一个逐渐衰退的过程,它不是在短时间内功能丧失,因此,男性在 50 至 55 岁年龄段未观察到一个骨量的快速丢失,这是男性与女性由于不同的生理功能,在骨骼方面表现的差异,但男性骨密度并非均匀一致的下降,在 70 至 74 岁阶段,骨密度明显降低,提示骨量丢失加速,有可能是男性髌部骨折发生率较高的原因之一,因为骨密度降低是骨折的危险因素^[12]。70 岁以上的老年男性一旦骨折,其并发症如静脉血栓、肺部感染、尿路感染及褥疮等疾病将严重影响老年人的生活质量,且死亡率极高,因此,检测 70 岁左右老年男性骨密度的变化,尽早发现骨丢失加速,对防治骨质疏松骨折有重要的意义。

腰椎骨密度随着年龄的增长呈下降趋势,但与其它部位的骨密度变化有所不同,80 岁以后 L_{1-4} BMD 呈现上升趋势,与国内外报道一致,可能与椎体的变形和退行性变有关^[13-15],也有可能与此部分高寿人群身体状况良好有关。这些特点提示要客观分析骨密度,仅 L_{1-4} BMD 单一部位的测定有可能不能全面的反映全身骨量的丢失。本研究还发现男性腰椎下降幅度较女性低^[11],有可能是男性椎体骨折发病率较女性低的原因之一^[16]。

文献报道,非承重骨骨折中,前臂骨折比较常见,其中桡骨骨折占前臂骨折的 77%,身体全部骨折的 18%,其主要致病因素为骨量减少和骨质疏松^[17]。本研究显示,85 至 90 岁的男性桡骨远端及桡尺骨远端的骨密度累计丢失率为 20.95% 和 25.68%,与股骨颈骨密度变化有相似之处,40 至 70 岁桡骨骨密度缓慢减低,70 至 74 岁后骨丢失加速,在目前承重骨骨密度检测已经备受重视的情况下,推荐常规前臂骨密度检测。

男性骨质疏松容易被漏诊^[18],其患病率报道不一,薛报道^[19]我国 60 岁以上的男性骨质疏松症的总患病率为 13.3%,而詹发现为 60%^[20]。本研究显示,50 岁以上男性骨质疏松和骨量减少的发生率为 19.8% 和 45.8%,50 至 69 岁比较稳定,70 岁

以后,骨质疏松发生率成倍增加,四分之三的 70 至 80 岁老年人有骨质疏松和骨量减少,而 80 岁以上老年人几乎都存在,对于 70 岁以上的老年人群,骨质疏松普遍存在,常规筛查这部分老年人群,以达到防治骨质疏松,避免骨折发生之目的。

本文仅阐述了男性骨密度变化的规律,对男性骨质疏松骨折存在一定的局限性,如在此基础上尝试其他骨折危险因素及其评价体系的研究是未来的方向。

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