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Analysis of Ultrasound Bone Mineral Density in 670 Retired Female Workers in Chengdu University

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ABSTRACT. *For hard work, research tasks or mental and physical stress, and lack of exercise, University Teachers become a high-risk groups and a blind spot of the National Fitness. In this article, only by testing 670 university retired teachers' radius bone massl density, the autor monitors the osteoporosis signs of retired teachers, Observes the trends of T value, Z value and provides a useful reference for Early prevention and diagnosis of osteoporosis.*

KEYWORDS: *bone mass density; female; osteoporosis; T value*

1. Introduction

As the population ages, osteoporosis (OP) is attracting more and more attention, and bone mineral density (BMD) is the direct cause of OP and osteoporotic fractures. Osteoporosis is known as the second largest "health killer" after cardiovascular disease. The disease is caused by imbalance of bone resorption and bone formation in human body. It is divided into two types: senile osteoporosis and postmenopausal osteoporosis, and its causes are complicated.

The routine detection of bone mineral density is mainly through the determination of the bone mineral content of the human body, directly obtaining the accurate content of bone minerals (mainly calcium), which is used to judge and study bone physiology, pathology and human aging, and to diagnose various diseases of the body. There are important tips [1]. Bone mineral density is an important indicator of bone quality and an important basis for reflecting the degree

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of osteoporosis and predicting the risk of fracture. Bone mineral density testing can better understand the individual's bone condition and develop a personalized, scientific exercise or rehabilitation program that can guide the public fitness more scientifically and comprehensively [2]. Measuring bone density is important for diagnosing osteoporosis and deciding whether or not to receive treatment.

2. 1 Research objects and measurement methods

2.1 Research object

From March 2017 to June 2017, the bone mineral density of the tibia was measured in the laboratory of the National Physical Fitness Monitoring Center of Southwest Jiaotong University. The measurement target was 670 retired female employees, with an age range of 50 to 85 years old.

2.2 Bone density measurement method:

Using the Omnisense 7000S Ultrasound Bone Densitometer from Israel's two FDA-certified EMI-Qualified, the unique bone axis sensing tip technology was used to test the bone density of the tibia of each subject. Instrument performance was measured before daily measurements. The calibration is detected, operated by the same laboratory assistant, and the computer prints the measurement results.

2.2.1 Diagnostic criteria for T and Z values:

It adopts the internationally accepted WHO diagnostic criteria and is expressed in the form of T value and Z value. The T value is the value obtained by comparing the measured bone density value with the bone peak of the normal population of the same race and the same race; the Z value is the measured bone density value compared with the normal population of the same age and the same race The value that comes out. Its formula is as follows:

T value = (measured bone density - average bone density in normal population from -20 to 40 years old) / standard deviation of bone density in normal population aged 20 to 40 years (SD)

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Z value = (measured bone density - average bone density of age-appropriate population) / standard deviation (SD) of bone density in age-appropriate population. The diagnostic criteria are shown in Table 1.

Table 1 Diagnostic criteria for osteoporosis

Comparison of peak bone mass with normal sex (represented by T value)	
Normal bone mass	T value>-1·0SD
Osteopenia	-2·5SD<T value≤-1·0S
Osteoporosis	T value≤2·5SD
Severe osteoporosis	T value≤2·5SD+fracture

2.2.2 Statistical analysis

Statistical processing data is exported by the instrument to avoid errors caused by the entry. The subjects were divided into age groups, and each age group was divided into 4 groups. The statistical analysis was performed using SPSS13.0. All data descriptive analyses were expressed by mean±standard deviation (X±S). Differences in T and Z values between different age groups were analyzed using One-way ANVOA. $P < 0.05$ was a significant difference, and $P < 0.01$ was a very significant difference.

3. Research results

The measured values of bone mineral density of 670 female employees in colleges and universities are classified according to age and gender. The T and Z values of bone mineral density in each age group are shown in Table 2. The statistical analysis of the percentage of osteoporosis incidence is shown in the table 3.

Table 2 T and Z values of bone mineral density at various ages

Age groups	Age(X±S)	n	T-score	Z-score
50-59	56.25±1.86	124	-1.487±1.254*	0.223±1.127*
60-69	65.2±2.71	288	-1.795±1.269**	0.388±1.161*

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70-79	73.44±2.41	231	-1.868±1.247**	0.47±1.15*
80-	82.54±2.44	27	-2.053±1.124	0.25±1.256

* : P < 0.05 is a significant difference, **: P < 0.01 is a very significant difference

It can be seen from Table 2 that the T value of each age group shows a downward trend. The decrease of the T value suggests that with the increase of age, the physiological function is degraded, the bone mass content of the human body is decreased, and the percentage of the risk of fracture is increased. The Z value increased in the 60-year-old age group and decreased in the 70-year-old and 80-year-old age groups, suggesting that we have a rapid decline in bone mass before and after menopause. Due to the marked decline in ovarian function, estrogen concentration decreases, leading to bone matrix formation. Insufficient, affecting calcium salt deposition. The age of 60 years old than the 50-year-old group suggests that with the stability of the internal environment, the bone mineral content and bone strength of the human body have increased slightly through exercise and health care. Therefore, the 60-year-old age group is slightly higher than the 50-year-old age group.

Table 3 Percentage change in bone mineral density by age

Age groups(year)	n	T>-1SD	-2.5SD≤T≤-1SD	T<-2.5SD
50-59	124	50(40.3%)	46(37.1%)	28(22.6%)
60-69	288	82(28.47%)	126(43.75%)	80(27.78%)
70-79	231	50(21.65%)	94(40.69%)	87(37.66%)
80-	27	5(18.52%)	9(33.33%)	13(48.15%)

It can be seen from Table 3 that the percentage of osteoporosis (OP) signs increased significantly after entering the old age. The incidence of OP in the 50-year-old age group was 22.6%, and the incidence of OP in the 60-year-old age group was 27.78%. BMD slows down, but the percentage of normal bone mass declines rapidly. The incidence of OP at 70 years old was 37.66%, the incidence rate of OP at 80 years old was 48.15%, and the ratio of normal people was 18.52%. The normal number of people from the 50-year-old to the 80-year-old age group has almost doubled, suggesting that age and ovarian function decline is an important reason for elderly women to have low bone mass and become a high-risk group.

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4. Discussion

Osteoporosis (OP) is a systemic bone disease characterized by decreased bone mass and impaired microstructural structure of the bone, resulting in increased bone fragility and increased risk of fracture. The prevalence of postmenopausal women can be as high as 30% to 50%. There are many factors affecting osteoporosis in women. The decline of estrogen levels caused by menopause is an important factor affecting female OP .

4.1 Incidence of osteoporosis

With the increase of age, the physical activity of the elderly is drastically reduced, and the dietary intake of calcium is seriously insufficient, leading to a rapid increase in the incidence of osteoporosis. The National Osteoporosis Foundation predicts that 52 million Americans over the age of 50 will be affected by osteoporosis in 2010. This test showed that there was a significant difference in the Z value between the age groups after 50 years of age ($P<0.05$), indicating that women entered the menopause and old age, and the bone condition changed significantly. Postmenopausal estrogen levels suddenly decreased, resulting in significantly enhanced osteoclast activity, bone resorption is greater than bone formation, resulting in accelerated bone loss caused by bone loss. China is entering an aging society and its situation will become more and more serious. Lin Biao et al [3] showed that bone mineral density test in 253 middle-aged and older women showed that osteoporosis occurred in 39.7% of women over 50 years old, and the detection rate was over 87.5%. The test data shows that the proportion of osteoporosis in female workers is 31.05%, which is much lower than its test, which may have a great relationship with the regular lifestyle of college teachers after retirement and scientific health care and attention to health. At the same time, we also suggest that we can use this as a guide to promote healthy exercise methods and scientific health care methods.

Studies have shown that [4] exercise load can increase the amount of loose bone, but the increase may not be much, can not compensate for bone loss caused by sex hormone deficiency, if the exercise load stops, the increased bone mass can disappear again. Regular physical activity has a long-term load stimulation on the

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bone structure and is therefore important in preventing osteoporosis. Evidence from many population studies also suggests that exposure to gravity can increase bone mineral content and thus delay bone loss.

4.2 Analysis of osteoporosis in all age groups of retired female employees in colleges and universities

Through this test, it can be seen that the bone mineral density of female employees in Chengdu is 187 (27.91%), 275 (41.04%), and 208 (31.05%). A large proportion of people are within the limits of osteopenia and osteoporosis, suggesting that we should pay attention to prevention, otherwise people with osteopenia can easily slip into osteoporosis. Studies [5] have shown that the percentage of osteopenia has decreased after the age of 70, but the percentage of osteoporosis is still rapidly increasing compared with the 50- and 60-year-old groups, indicating that the elderly in colleges and universities Female workers have very common signs of osteoporosis.

According to reports [6], the normal change of bone mass in healthy adults is 0.5% to 2.0% per year. Women's menopause is reduced by the secretion of estrogen, and the bone loss in early menopause is significantly accelerated, reaching 2.0% to 3.0% per year, and aging. The bone loss caused by the loss of about 1.0% per year, women affected by the dual factors of menopause and aging, can lose 30% to 40% of the peak bone mass in a lifetime. With the prolongation of menopause, the bone strength gradually decreased, with the fastest decline in 5-10 years after menopause, and the decline was smooth after 10 years . The measurement data of this survey is basically consistent with many research data at home and abroad. The Z value and T value of female employees in the 50-year-old age group are not very high compared with the 60-year-old 70-year-old age group. The suggestion has a great relationship with the menopause. According to the survey, the elderly over 60 years old pay more attention to exercise and health care. This also suggests that diet and health care play an important role in slowing bone loss. The survey analyzes the causes of rapid bone loss in women in the 50-year-old group. Among them, physiological aging and menopause are the main factors. Lifestyle has a lot to do with not paying attention to health care.

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5. Measures to prevent osteoporosis

5.1 Scientific fitness, develop good habits

Studies have shown that exercise not only has a stress effect on bone, but also produces hormone, cytokines and calcium to regulate bone metabolism; exercise may cause changes in sex hormones and thus affect bone density, which affects bone density in exercise. May be more important [9]. Studies have shown that moderate weight-bearing exercise can reduce bone loss and may even increase bone density; walking for 20 to 30 minutes a day helps bones to be strong, and other beneficial forms of exercise include aerobics and proper jogging. .

5.2 Reasonable meal

Dietary changes are also an important factor affecting bone changes. Food can provide essential nutrients that help healthy bone formation, while others promote bone loss. For example, sugar, beef and mutton and carbonated beverages all accelerate bone decalcification. Smoking and drinking also increase the risk of osteoporosis; while milk, green leafy vegetables, sardines, squid, seafood and sesame are rich. Contains nutrients such as calcium and magnesium.

5.3 Calcium intake

Milk and dairy products are good sources of calcium. Lactose contained in milk can promote the full absorption of calcium. Studies have shown that the consumption of milk in a country is negatively correlated with the prevalence of osteoporosis. In addition, eating seaweed, shrimp skin, beans, nuts and some small fish and shrimp that can be eaten with bones also have better calcium supplementation effect. The primary function of vitamin D is to increase plasma calcium and phosphorus levels to supersaturation to accommodate bone mineralization. There are two sources of vitamin D, one is exogenous, depends on the source of food: the other is endogenous, produced by human skin through sunlight.

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5.4 Health care

In the menopause, some health care drugs such as calcitonin and phosphate should be used under the guidance of doctors to increase the calcium content in the bone, promote bone formation, inhibit the destruction of bone cells, prevent and treat osteoporosis, and reduce fractures. The danger to improve the quality of life in later life.

6. Conclusions and recommendations

The percentage of osteoporosis signs of retired female workers increases with age. Menopause and aging are the main factors causing bone loss in women; the incidence of osteoporosis is related to age, lifestyle, and whether they often go out, Eating foods with high calcium content and common dairy products and soy products; the relative value of Z in the 50-year-old age group is slightly lower than that in the 60-year-old and 70-year-old age groups, suggesting that on the one hand, it may be related to menopause, and the other may be related to pre-retirement. Lifestyle, and health awareness is not relevant.

The defects of bone structure caused by osteoporosis are irreversible, and severe cases are prone to fractures and even body deformities [10]. Prevention of osteoporosis begins early, and the stronger the bones in children and young, the more likely they are to maintain bone strength in old age. Prevention of osteoporosis is more important than treatment. It is recommended that women should start health care as soon as possible to prevent osteoporosis.

References:

[1] Liu Zhonghou(1998). Osteoporosis. Beijing: Science Press, pp.186-190.

[2] Xu Jianchun, Mao Yingdelong, Shi Xiaolin, et al(2006). Research progress of osteoporosis . Zhejiang Clinical Medicine, vol.8, no.1, pp. 95-96.

[3] Lin Biao, Chen Dangsheng(2004). Analysis of bone mineral density test results in 253 middle-aged and elderly women Guangdong Medical Journal, vol.25, no.8,pp. 925-926.

[4] Chen Bailing, Li Fobao, et al(2002). Study on the relationship between female

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physical activity level, bone mineral content and bone metabolism. Chinese Journal of Sports Medicine, Vol. 21, No. 6, pp. 579-582.

[5] Chen Ling(2009). Quantitative ultrasound bone mineral density analysis of 1 502 female calcaneus in Chengdu area. Sichuan Sports Science. No.2, pp.46-50.

[6] Landin-Wilhelmsen K, Wilhelmsen L, Bengtsson BA(1999). Post-menopausal osteoporosis is more related to hormonal aberretionsthan to lifestyle factors. Clin Endocrinol Oxf, vol.51, no.4, pp.387-394.