

Retraction

Retracted: Effect of Core Muscle Strength Training Combined with Taijiquan on Bone Mineral Density Measured by Quantitative CT Scanning in the Elderly

Scanning

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

In addition, our investigation has also shown that one or more of the following human-subject reporting requirements has not been met in this article: ethical approval by an Institutional Review Board (IRB) committee or equivalent, patient/participant consent to participate, and/or agreement to publish patient/participant details (where relevant).

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

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- [1] M. Zhong, "Effect of Core Muscle Strength Training Combined with Taijiquan on Bone Mineral Density Measured by Quantitative CT Scanning in the Elderly," *Scanning*, vol. 2022, Article ID 6942081, 7 pages, 2022.

Research Article

Effect of Core Muscle Strength Training Combined with Taijiquan on Bone Mineral Density Measured by Quantitative CT Scanning in the Elderly

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Learn about the benefits of muscle strength training combined with tai chi for adult skeletal muscle in multiple CT scanning. The study included 182 people over the age of 60 with no long-term history of physical activity and exercise. They were divided into the Taijiquan group (52 people), student muscle strength group (45 people), student muscle group combined with Taijiquan group (45 people), and control group (40 people). The board of directors did not attend. The other three groups received tai chi (more than 4 times a week), muscle strength training, and muscle training combined with tai chi for 6 months. Lumbar spine (L1-4) BMD and Berg scores were approximately the same as those measured in adults before exercise and at 3 and 6 months after exercise. The results showed that there were significant differences in the scores of lumbar spine BMD and Berg Balance Scale between the Taijiquan group and students before and after exercise combined with muscle strength training ($P < 0.05$ or < 0.01). The difference was statistically significant ($P < 0.05$). The scores of lumbar BMD and Berg Balance Scale in the core muscle strength training combined with Taijiquan group after 6 months of exercise were higher than those after 3 months of exercise ($P < 0.05$), and the CT value of lumbar vertebral bone calcium was significantly positively correlated with BMD (Pearson correlation coefficients of L5 vertebral body were $r = 0.704, 0.683, 0.728, 0.673, \text{ and } 0.686, P < 0.01$). Single or combined training of core muscle strength or Taijiquan can improve lumbar bone mineral density and balance function in the elderly.

1. Introduction

In recent years, countries pay more and more attention to the research on the physique of the middle-aged and elderly, focusing on the influencing factors of the health of the middle-aged and elderly, especially the impact of exercise on the health of the middle-aged and elderly. The American Association of Sports Medicine (AASM) found through research that the elderly can effectively improve cardiovascular function and prolong life through regular endurance training. Regular exercise behavior can improve the bone health of middle-aged and elderly people, prevent osteoporosis [1], increase physical stability, reduce the risk of fracture, and slow down the aging of physiological function, especially the decline of muscle function. Nichols's experiment found that the lean weight of middle-aged and elderly

people increased after regular exercise for a long time, and the body fat composition also decreased significantly. The respiratory function of the elderly decreased significantly. The respiratory muscle strength of elderly women is weakened, the alveolar fusion and the elasticity of lung tissue are weakened, the oxygen diffusion function begins to appear as an obstacle, the activity of the thorax becomes smaller, and the ventilation function of the lung decreases accordingly [2]. Therefore, in the process of strenuous exercise, if you want to improve lung ventilation, you can only be effective by increasing the frequency of breathing, rather than simply increasing the depth of breathing. Even if the respiratory system function decreases with aging, the lung ventilation reserve of healthy elderly people still has a considerable degree of accommodation. Pay attention to maintenance at ordinary times. Exercising more and prolonging

the health level of cardiopulmonary function will not cause too much problems.

With the aggravation of population aging in China, senile osteoporosis has become a problem of widespread concern, which seriously affects the daily life of the elderly. Domestic research on the health care function of traditional boxing exercises shows that Taijiquan can improve the brain function, physical strength, and balance function of the elderly, so as to prevent falls. Core muscle strength training stabilizes the spine and pelvis by controlling the trunk strength of the whole body, so as to improve the level of controlling the trunk balance function, improve the efficiency of limb coordination, reduce energy consumption, and prevent sports injury. However, there is no report on the relevant research on the combination of the two. This study observed the effect of regular core muscle strength training combined with traditional 24-style Taijiquan exercise on bone mineral density and balance function of the elderly for 6 months, so as to provide a more scientific and effective training method for the elderly to prevent falling and osteoporosis [3].

Noninvasive examination of large bone marrow and bone marrow is essential for early prevention and treatment of osteoporosis. Currently, there are several ways to measure bone mineral density (BMD) (Figure 1). The two most widely accepted methods are dual-energy X-ray absorptiometry (DXA) and quantitative computed tomography (QCT). In recent years, there have been a large number of studies on the two methods to measure BMD. Dual-energy CT (DECT) can detect the separation of substances through the difference of dual-energy index between different substances. It can pass through the cancellous bone and excessively separate the bone mineral and bone marrow in the bone tissue, so as to obtain a separate calcium map or bone marrow map, so as to realize the quantitative measurement of BMD. In this study, dual-energy CT scanning was used to measure BMD by using dual-energy material separation technology, and the BMD of the vertebral body was measured by comparing with single-energy QCT to evaluate the application value of DECT in the measurement of bone mineral density [4].

2. Literature Review

Wang and others believe that Taijiquan is a whole-body participatory exercise. During Taijiquan exercise, the knee joint is basically in a squat state, in order to stabilize the strength of the lower limbs. Even with the movement and center of gravity transfer, it is also required to keep the lower limbs stable, the transition is stable, and the footwall is stable before the movement is smooth. Standing with eyes closed and one foot is an effective method to evaluate the balance of the human body in a static state, which reflects the vestibular system function of the elderly [5]. Lin and others believe that Taijiquan exercise has a significant effect on the strength of quadriceps femoris and cochineal muscles in the elderly. Because in Taijiquan, the center of gravity of the body is always kept at a low position, the quadriceps femoris is in a state of alternating relaxation and tension for a long time, which stimulates the muscle, accelerates the metabolism,

increases the opening of capillaries, increases the blood supply, enhances the absorption and storage capacity of nutrients such as protein, thickens the muscle fibers, increases the muscle volume, and then makes the muscle become stronger and stronger [6]. Gong and others believe that in terms of cardiopulmonary function, the maximum oxygen intake is a comprehensive index to evaluate cardiopulmonary function. It reflects the body's ability to transport oxygen and the efficiency of using oxygen and is an important factor to determine the exercise ability. The maximum oxygen intake decreases with age, and the cardiac output is positively correlated with the maximum oxygen intake [7]. Aas and others believe that the physical work ability PWC170 is an index recommended by the World Health Organization to evaluate the physical work ability of adolescents, while PWC130 is an index to evaluate the physical work ability of middle-aged and elderly people [8]. Tice and others believe that the maximum oxygen intake and body work ability of middle-aged and elderly women are significantly improved after long-term Taijiquan exercise, which shows that long-term Taijiquan exercise can effectively improve the heart function capacity and body work ability of the elderly [9]. Reis and others believe that the respiratory function of the elderly is gradually declining, the respiratory muscle function is impaired, the work efficiency is limited, the muscle strength and endurance are declining, and the respiratory reserve is significantly reduced. The maximum ventilation volume per minute reflects the maximum ventilation capacity of the lung and the reserve capacity of ventilation function under continuous ventilation. It is an index that can comprehensively reflect the function of the whole respiratory system [10]. Hwang and others believe that the maximum ventilation volume decreases rapidly with the increase in age. The maximum ventilation of the elderly is reduced due to the reduction of the contractility of respiratory muscles, the weakening of the compliance of the lungs and thorax, the increase in respiratory resistance, and the reduction of sensitive excitability of the respiratory center [11]. Hwang and others said that the maximum ventilation of middle-aged and elderly women who have participated in Taijiquan for a long time shows an upward trend, and the vital capacity (VC), forced vital capacity (FEV1), and airway obstruction (FEV1/FVC) are significantly increased, indicating that Taijiquan exercise can increase respiratory reserve, delay the degradation of ventilator energy caused by aging, significantly improve pulmonary elastic retraction, improve respiratory muscle strength, increase oxygen uptake, and ensure the body's demand for oxygen. After keeping the habit of Taijiquan exercise for a long time, the systolic blood pressure, diastolic blood pressure, and average arterial pressure of middle-aged and elderly women decreased significantly in a quiet state. The change of blood pressure ensures the coronary blood flow and myocardial blood supply .

3. Experimental Analysis

3.1. Research Object. 182 elderly people over 60 years old without long-term exercise history and exercise habits in



FIGURE 1: The main reasons for the effect of bone density.

the community were randomly divided into 4 groups: 52 cases in the core muscle strength training plus Taijiquan group (age: 68.41 ± 6.25 years; height: 163.07 ± 6.39 cm; and body weight: 63.06 ± 8.49 kg); 45 cases in the Taijiquan group (age: 68.15 ± 4.67 years; height: 165.19 ± 5.44 cm; and body weight: 66.06 ± 8.42 kg); 45 cases in the core muscle strength training group (age: 68.62 ± 6.47 years; height: 163.16 ± 6.45 cm; and body weight: 63.06 ± 8.49 kg); and 40 cases in the control group (age: 66.69 ± 4.11 years; height: 163.73 ± 5.49 cm; and body weight: 63.25 ± 7.07 kg). There was no significant difference in age, height, and body mass among the four groups ($P > 0.05$). Inclusion criteria were as follows: (1) those aged ≥ 60 ; (2) no long-term exercise history and no long-term Taijiquan practice history; (3) no diseases that seriously affect core muscle strength training and Taijiquan exercise, such as joint deformity, spinal joint-related diseases or severe pain, and serious cardiopulmonary diseases; (4) no other serious organic diseases; and (5) those who voluntarily cooperate with this study in core muscle strength training and Taijiquan exercise and can accept a questionnaire survey, bone mineral density (BMD) test, and Berg Balance Scale score test. Exclusion criteria were as follows: (1) those who cannot be trained for a long time (this test requires 6 months), (2) those with cognitive impairment [12], (3) serious mental illness, and (4) observers who are receiving other relevant treatment that may affect the effect indicators of this study.

3.2. Method

3.2.1. Taijiquan Group. Video teaching of Taijiquan shall be carried out first, and then, 24 simplified Taijiquan teaching

training shall be carried out for the elderly by Taijiquan professionals. The training shall not be less than 4 times a week, and each training shall not be less than 30 minutes (not less than 5 times), and the training shall be continued for 6 months.

3.2.2. Core Muscle Strength Training Group. The core muscle strength training is guided by the rehabilitation therapist. Methods for the elderly are as follows: lift the back and hip and stretch the hip to increase the strength of the back and hip. (1) For the elderly, it is convenient to bend the hip at home. (2) For one leg bypass, in the supine position, bend the hip and knee of the left lower limb, straighten the right leg, exert force on the hip and waist back, lift the waist back, hip, and right lower limb, straighten the hip joints on both sides, and carry out alternately on both sides with only the shoulders and left foot as the fulcrum of the body. (3) For step in lying position, in the supine position, bend the hips and knees of both legs and step alternately with left and right feet. (4) For flat support, in the prone position, with both forearms and feet as the fulcrum, support the body and hang it in the air. The body is in a straight line to maintain the movement. (5) For diagonal support of the kneeling position, take the kneeling position, first support the body with both hands and knees, straighten both upper limbs, bend both hips and knees by 90° , then straighten the left upper limb forward, extend the right lower limb backward, form a straight line with the trunk, and only support the body with the right hand and left knee [13], alternating on both sides. Each action is repeated 10 times, each action lasts for 5~10s, and the action interval is 5~10s.

The five training movements were performed in two groups for a total of about 40 minutes (about 3 minutes for double leg bridging, about 5 minutes for bilateral alternation of single leg bridging, 3 minutes for treadmill in lying position, about 3 minutes for plate support, and about 5 minutes for bilateral alternation of diagonal support in the kneeling position). They were practiced at least 4 times a week for 6 months.

3.2.3. Core Muscle Strength Training plus Taijiquan Group. The training content includes core muscle strength and Taijiquan, which are completed in the morning and afternoon. The core muscle strength training and Taijiquan are not less than 30 minutes and not less than 4 times a week and practiced continuously for 6 months.

3.2.4. Control Group. The subjects lived according to their previous living habits without training.

In this study, a Norland XR-46 dual-energy X-ray BMD tester (Norland Company of the United States) was used to scan the lumbar spine (L1-4) for 5 times before the exercise intervention and 3 months and 6 months after the intervention. The following 14 items were evaluated according to the evaluation standard of the Berg evaluation scale: stand up from a sitting position, stand without support, sit without back but with both feet on the ground or on a stool, sit down from a standing position, transfer, stand with eyes closed without support, stand with both feet together without support, stretch forward and move forward when standing, pick up items from the ground when standing, turn back from the standing position, turn 360°, put one foot on a step or stool when standing without support, stand with one foot in front, stand without support, and stand on one leg. Each item has a minimum score of 0 and a maximum score of 4, with a total of 56. The test is generally completed within 20 minutes. According to the score, it is divided into three levels: 0~20 (wheelchair), 21~40 (auxiliary walking), and 41~56 (independent walking). A score lower than 40 indicates the risk of falling.

3.3. Statistical Methods. The data were analyzed by using SPSS 19.00 statistical software. The measurement data were expressed as mean \pm standard deviation ($\bar{x} \pm s$). One-way ANOVA was used for intergroup comparison. For multiple comparisons within the group, the LSD-*t* method or SNK-*q* method was used when the variance was homogeneous, and Tamhane's T2 method was used when the variance was uneven. $P \leq 0.05$ means that the difference is statistically significant [14].

3.4. Result Analysis. All subjects in this study completed DECT and QCT bone mineral density measurements of lumbar vertebrae 1-5. The measurement results are shown in Table 1. According to the QCT bone mineral density diagnostic standard 4 recommended by experts of the International Society for clinical bone mineral density (ISCD) in 2007, 6 subjects in this study were diagnosed with osteoporosis, with a BMD of the 57.66 ± 13.75 mg/cc; 13 subjects were diagnosed with low bone mass [15], and the BMD

TABLE 1: Bone calcium CT value, bone marrow CT value, and BMD value measured by QCT of lumbar vertebrae measured by DECT ($\bar{x} \pm s$).

Lumbar vertebrae	BMD value measured by QCT (mg/cc)	DECT bone calcium-related CT value (HU)
L1	124.92 \pm 27.30	223.76 \pm 38.18
L2	120.91 \pm 28.68	221.80 \pm 39.74
L3	114.92 \pm 28.04	220.11 \pm 36.01
L4	117.31 \pm 29.69	225.71 \pm 34.22
L5	130.32 \pm 30.61	239.22 \pm 36.09

was 103.44 ± 14.15 mg/cc. The bone mass of 37 subjects was normal, and the BMD was 135.74 ± 13.45 mg/cc.

There was a significant positive correlation between the bone calcium CT value of the lumbar spine (LS) vertebral body measured by DECT and the BMD value measured by QCT. The Pearson correlation coefficients were as follows: r lumbar 1 vertebral body = 0.715, r lumbar 2 vertebral body = 0.692, r lumbar 3 vertebral body = 0.739, r lumbar 4 vertebral body = 0.673, and r lumbar 5 vertebral body = 0.686, respectively ($P < 0.01$). There was a positive correlation between bone marrow CT value and BMD value. Pearson correlation coefficients were as follows: RL1 vertebral body = 0.343, RL2 vertebral body = 0.315, RL3 vertebral body = 0.439, RL4 vertebral body = 0.440, and RL5 vertebral body = 0.456, respectively. The difference was statistically significant (LS vertebral body, $P < 0.05$; the rest, $P < 0.01$).

There were significant differences in lumbar BMD before and after exercise in the core muscle strength training combined with Taijiquan group, Taijiquan group, and core muscle strength training group ($P < 0.05$ or < 0.01). The lumbar BMD of the core muscle strength training combined with Taijiquan group, Taijiquan group, and core muscle strength training group after 6 months of exercise was higher than that before exercise [16]. The lumbar BMD of the core muscle strength training combined with Taijiquan group after 6 months of exercise was higher than that of 3 months of exercise ($P < 0.05$).

There was no significant difference in the BMD of the lumbar spine between the four groups before and 3 months after exercise ($P > 0.05$). The lumbar spine BMD of the core muscle strength training combined with Taijiquan group, Taijiquan group, and core strength training were all higher than those of the control group [17]. The lumbar spine BMD of the core muscle strength training combined with Taijiquan group was higher than that of the Taijiquan group and the core muscle strength group (total $P < 0.05$), as shown in Table 2.

After 6 months of the youth strength training combined with Taijiquan team, Taijiquan team, and students' muscle strength training, the Berg Balance Scale scores of the same group were higher than those before training ($P < 0.01$). Months later, exercise was higher at 3 months ($P < 0.01$). After 6 months of strenuous exercise, the strength of the Berg Balance Scale combined with Taijiquan group, Taijiquan group, and core muscle group in

TABLE 2: Changes of lumbar spine (L1-4) BMD of subjects in each group before and after exercise.

Group	<i>n</i>	Before exercise	Exercise for 3 months	Exercise for 6 months	<i>F</i> value	<i>P</i> value
Core muscle strength + Taijiquan group	50	43.1 ± 2.45	44.62 ± 1.09	47.5 ± 2.01	24.187	<0.01
Taijiquan group	50	44.2 ± 3.23	44.84 ± 3.16	45.0 ± 3.15	4.931	<0.05
Core muscle strength training group	47	45.15 ± 4.14	43.746 ± 2.98	44.87 ± 1.81	3.150	<0.05
Control group	45	41.2 ± 3.15	43.2 ± 3.05	43.2 ± 3.05	0	>0.05
<i>F</i> value		0.086	0.276	8.524		
<i>P</i> value		>0.05	>0.05	<0.01		

TABLE 3: Comparison of Berg Balance Scale scores of subjects in each group.

Group	<i>n</i>	Before exercise	Exercise for 3 months	Exercise for 6 months	<i>F</i> value	<i>P</i> value
Core muscle strength + Taijiquan group	50	0.751 ± 0.47	0.862 ± 0.22	1.061 ± 0.25	9.860	<0.01
Taijiquan group	50	0.721 ± 0.38	0.785 ± 0.28	0.984 ± 0.278	3.747	<0.05
Core muscle strength training group	47	0.841 ± 0.31	0.979 ± 0.23	0.991 ± 0.23	5.364	<0.01
Control group	45	0.828 ± 0.267	0.829 ± 0.226	0.824 ± 0.278	0	>0.05
<i>F</i> value		0.054	1.313	6.763		
<i>P</i> value		>0.05	>0.05	<0.01		

youth muscle strength training was higher than that of the control group ($P < 0.01$) [18]. After 6 months of exercise, the Taijiquan group had higher muscle training Berg Balance Scale scores than the Taijiquan group and the core muscle group ($P < 0.05$). See Tables 3 and 4.

Table 4 shows that after the test, the four indexes tested in the regular Taijiquan exercise group have significant differences compared with those in the nonexercise group ($P < 0.05$).

4. Discussion

With the aging of the world population, the incidence rate and disability rate of osteoporosis have been significantly improved, which has brought heavy burden to patients and society. Therefore, early diagnosis of osteoporosis is very important [19]. The main evaluation index of osteoporosis is bone mineral density (BMD). Dual X-ray absorptiometry (DXA) is a commonly used imaging diagnostic method for measuring bone mineral density. Although the measurement is simple and widely used in clinic, there are still many deficiencies. Because DXA is an area BMD measurement, the measurement results include the comprehensive measurement values of cancellous bone and cortical bone at the same time, and the early bone mass change of osteoporosis mainly occurs in cancellous bone, the measurement results of DXA cannot reflect the early bone mineral density change, and there are many factors affecting the measurement results, resulting in large measurement error. Compared with DXA, QCT measures the true volumetric bone mineral density, which can independently measure the bone mineral density of vertebral cancellous bone. The measurement results are generally not affected by bone size, shape, hyperosteo-

years, the value of QCT in the early diagnosis of osteoporosis has attracted more and more attention, and there are more and more studies on the measurement of BMD by QCT [20]. Studies have shown that the detection rate of osteoporosis by QCT is higher than that by DXA, suggesting that measuring BMD by QCT can detect osteoporosis earlier, which is conducive to the early prevention and treatment of osteoporosis. However, because QCT measurement needs special calibration phantom and measurement software, its application is also limited.

With the increase in age, the body tissue of the elderly gradually shows physiological decline, resulting in bone metabolism disorder and bone absorption being greater than bone formation and finally leading to bone loss, which is prone to osteoporosis and even fracture. At the same time, with the decrease in activity, muscle strength, and physical stability, the physical exercise ability of the elderly decreases. Balance function is the ability of the body to adjust itself to prevent falling when the body posture is stable or under the action of external force. It is affected by many factors such as age, muscle strength, proprioception, and vision [21]. Long-term regular Taijiquan exercise and resistance training are helpful to improve the bone mineral density, muscle strength, balance, and posture control ability of the elderly. Research has confirmed that regular physical exercise can improve the bone mineral density of the elderly. It is an important means to delay the process of physical aging and improve the physique of the elderly. Taijiquan is a sport with the advantages of soothing, gentle, dynamic, and static combination, moderate exercise intensity, low risk, and not being easy to be injured. It is one of the preferred exercise methods for the elderly.

Generally speaking, bone mineral density is affected by many factors such as heredity, nutrition, hormones, and

TABLE 4: Effect of Taijiquan exercise on bone mineral density of the elderly.

Index	No exercise group ($n = 28$)	Exercise group ($n = 28$)
L2~L4	0.830 ± 0.153	$0.813 \pm 0.126^*$
Neck	0.873 ± 0.134	$0.750 \pm 0.144^*$
Ward's	0.469 ± 0.129	$0.679 \pm 0.143^*$
Torch	0.518 ± 0.147	$0.658 \pm 0.142^*$

physical exercise. Due to the frail adult body and poor bone metabolism, bone resorption exceeds bone formation, resulting in bone loss. Improper functioning of the bones can cause the bones to deform, which can lead to the synthesis of DNA and collagen in the bones, which can lead to bone loss [22]. On the contrary, when the mechanical stress decreases, the weight of the bone decreases with the decrease in stress. Moderate exercise can significantly increase the bone density of the human body, regulate the bone metabolism of the body, and moderately increase the total amount of bone in the body. As one of the main factors affecting bone mass, physical exercise cannot completely control the decrease in bone mineral content with age and menopause, but it plays a positive role in bone blood circulation, helps to prevent bone loss, and effectively stimulates the formation of bone cells, which plays a very important role in the prevention of osteoporosis. The results showed that the bone marrow level in the study group was higher than that in the four groups (L2-0, $P < 0.05$). Studies have shown that regular tai chi exercises can improve bone marrow function in older adults. This may be because Taijiquan integrates isotonic exercise and isometric exercise. It produces load through muscle contraction, which directly or indirectly acts on bone, changes the voltage in bone, and then stimulates the formation of osteoblasts. It can not only maintain bone mass or increase bone mineral density but also increase the elasticity of bone and enhance the ability of antibending, antiextrusion, and antitorsion. Secondly, Taijiquan's unique body method, step method, and gentle wave movement can massage the periosteum, improve the blood supply of bone tissue, and promote the absorption of bone nutrients. At the same time, Taijiquan belongs to aerobic exercise. Long-term aerobic exercise can increase muscle strength, coordination, and balance, repair bone structure and bone mass, stimulate osteoblast activity, and increase bone formation [23].

As an easy way to master aerobic exercise, Taijiquan has a good mass base in China's community. The exercise intensity is light and medium, the required site has no special requirements, and the physiological burden is small, safe, and feasible. It is not only suitable for exercise in groups but also suitable for individual physical exercise. The exercise should start from low intensity, step by step, and must be persistent in order to maintain the exercise effect and achieve the purpose of improving the middle-aged and elderly in the community, reducing the risk of cardiovascular and cerebrovascular diseases and preventing osteoporosis.

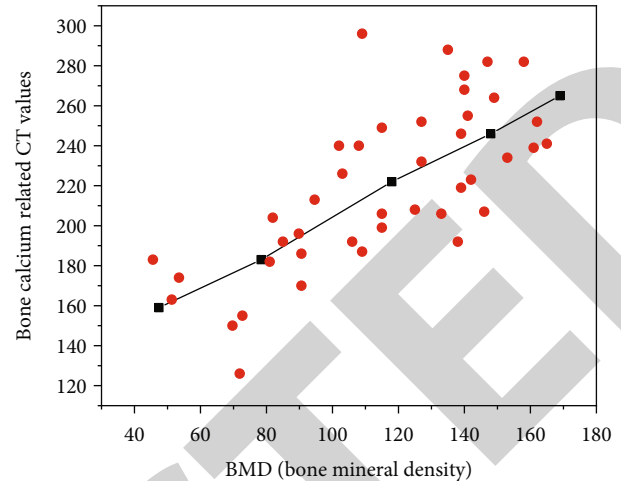


FIGURE 2: Correlation between vertebral QCT bone mineral density and DECT bone calcium CT value.

5. Conclusion

Taijiquan exercise can effectively improve the body composition of the elderly and increase bone mineral density. This has a positive effect on reducing the risk of cardiovascular and cerebrovascular diseases and preventing osteoporosis. Taijiquan entering the community has the needs of the times. It can exercise the body, enhance physique, promote mutual exchanges among community residents, enrich community cultural life, and enable more people to enjoy the health and happiness brought by Taijiquan in a harmonious society. Taijiquan has rich connotation and a unique way of movement. In the long-term development process, it is organically combined with Chinese traditional culture to form a boxing technique integrating self-cultivation, fitness, and medical treatment, which is not limited by venues and equipment. Research shows that Taijiquan exercise plays a positive role in improving calcaneal bone mineral density and preventing osteoporosis in middle-aged and elderly people. Taijiquan exercise plays a positive role in shortening the reaction time of middle-aged and elderly people and improving the sensitivity of middle-aged and elderly people. Taijiquan is a traditional sport with a long history. It has small exercise load and mellow, gentle, coherent, and natural movements. When exercising, we should relax physically and mentally without high physical and mental tension, which is very in line with the sports ability and physiological characteristics of the middle-aged and elderly and is very suitable for the middle-aged and elderly to practice. Therefore, we should vigorously encourage the middle-aged and elderly to perform Taijiquan exercise.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The author declares that he has no conflicts of interest.

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