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Articular Cartilage in Patients with Knee Osteoarthritis Due to Microscope

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Abstract: With the increase of age, the prevalence of osteoarthritis increases rapidly, which is the main cause of joint pain and disability in the elderly. Under the simultaneous action of various external and internal factors, firstly, hyaline cartilage in the joint has cell degeneration, extracellular matrix degradation or variation, then inflammatory factors can be released and adhesion occurs, making the joint inflammatory response, and finally the articular cartilage gradually fibrosis, thus showing the symptoms of joint pain and loss of function. Therefore, this paper starts from the point of view of the relationship between articular cartilage and knee osteoarthritis and the influence of Taijiquan on articular cartilage. Based on this background, the research content of this paper is based on the ultrastructural analysis of articular cartilage in the patients with knee osteoarthritis after exercise with microscope. Through the simulation analysis of Japanese white rabbits and knee osteoarthritis patients, the results show that 1 At 6 weeks, compared with 8 weeks, the pathological changes of cartilage tissue were further aggravated, the cartilage layer became thinner, the cartilage membrane was damaged, the number of chondrocytes was significantly reduced, deformation and necrosis were observed. There was no significant difference in the activity of complex enzyme between OA patients and normal people, but it was lower than that of normal people.

1. Introduction

The research on knee osteoarthritis has made some progress, but there is still no breakthrough in treatment. Ageing and chronic injury are considered to be the main causes of joint degeneration. On the one hand, although surgical treatment has an advantage in the treatment of late disease or serious complications, it does not fundamentally solve the pathology of knee osteoarthritis Progress can only be used as a remedy; on the other hand, conservative treatment is widely used in the early and mid-term of knee osteoarthritis and even postoperative rehabilitation, and the clinical efficacy has been confirmed.

Modern biological research shows that cytokines, growth factors and immune factors are all related to the pathogenesis of osteoarthritis [1]. Georgiev's research on osteoarthritis shows that osteoarthritis is a kind of degenerative joint disease, which is characterized by the loss of articular cartilage, the change of protrusion and underlying bone along the bone edge, as well as many biochemical and morphological changes, involving synovium and joint capsule as well as the structure around the joint. It is the most common clinical syndrome of joint pain, with varying degrees of functional impairment and quality of life decline. Although the loss of articular cartilage is not the only morphological basis of osteoarthritis, it is the basis of pathological process and accompanied by clinical manifestations [2-3]. The purpose of Bryk was to evaluate whether the strength, pain relief, joint function recovery and joint function recovery of quadriceps femoris in patients with knee osteoarthritis were the same when they were in the rehabilitation plan of low load exercise and PVO, and compared with women who were in high load exercise without PVO, their function improved[4-5].

The pathogenesis of knee arthritis is complex. At present, articular cartilage degeneration is the pathogenic factor and main pathological feature of knee arthritis [6]. The theoretical biphasic analysis combined with the corresponding experimental measurement of articular cartilage successfully revealed the basic material characteristics and mechanical behavior of articular cartilage with a large amount of water. The idea of load distribution between solid phase and fluid phase promotes the prediction of friction behavior of articular cartilage. One of the latest concerns about the two-phase finite element analysis seems to be a dynamic and physiological condition, whose mechanical function as the load-bearing of the joint system goes beyond the material test, which focuses on the relatively small reaction force and deformation with time, and low-speed compression. The two-phase finite element model for reciprocating sliding motion is applied to confirm the effect of friction on the moving contact area. The results show that, compared with the case without moving contact area, the cylindrical indenter model sliding on the cartilage surface significantly improves the proportion of fluid load support, but the effectiveness of the constitutive material performance has not been fully evaluated for sliding motion. In Nobuo's study, in the first stage, the compression response of articular cartilage was examined by a high-precision testing machine. The material properties of the two-phase finite element model include the inhomogeneity of the apparent Young's modulus along the depth of the solid phase, the strain related permeability and the enhancement of collagen in the tensile strain. Through the cylindrical indentation test, the model simulation is estimated by the curve fitting between the experimental behavior changing with time and the finite element. Nobuo then simulated the biphasic lubrication mechanism of articular cartilage including the migration contact area to elucidate its function as a load-bearing material [7-8]. Knee joint cartilage defect is a common kind of articular cartilage defect in athletes. Due to the physiological needs of sports, the joints are under great stress. Cartilage defect is related to pain and functional damage, which limits the participation of movement, and may develop into joint degeneration and arthritis. The management of cartilage injury has been established to enable athletes to return to high impact sports. It can be considered to protect existing cartilage, promote cartilage formation and surface repair. Repair and regeneration of cartilage must be very similar to normal hyaline cartilage, and function is similar, this ability may be the most important factor to restore movement [9-10]. Because of the importance of the research on articular cartilage, this paper analyzes the ultrastructure of articular cartilage in patients with knee joint osteoarthritis.

Articular cartilage degeneration is the characteristic pathological change of primary osteoarthritis, and it is also the most basic pathological change. At present, there is no exact diagnosis basis for osteoarthritis. Based on the review of the morphological structure and functional relationship of human normal osteochondral complex tissue, this paper focuses on the ultrastructural pathological changes of osteochondral in osteoarthritis, providing a strong theoretical basis for the diagnosis of osteoarthritis of knee.

2. Ultrastructure and Movement of Articular Cartilage in Patients with Knee Osteoarthritis

2.1. Osteoarthritis of Knee Joint

Knee osteoarthritis is a chronic joint disease characterized by aging, trauma, obesity, inflammation or other causes. It is characterized by degeneration of articular cartilage and secondary bone hyperplasia. It has a high incidence rate, accounting for 41% of the total osteoarthritis. The exact etiology and pathogenesis of KOA are still unclear, and its treatment is still one of the difficult problems in clinical orthopaedics. As one of the effective methods of conservative treatment, physical therapy is increasingly favored by doctors and patients. Koa is the result of uncoupled degradation and synthesis of chondrocytes, extracellular matrix and subchondral bone under the joint action of mechanical and biological factors. The pathological process of KOA not only affects the articular cartilage, but also involves the subchondral bone, ligament, joint capsule, synovium, muscles and tendons around the joint, which eventually leads to joint pain and loss of function. Its main clinical manifestations are repeated pain of the knee joint, dysfunction of movement, swelling and deformation of the joint, which seriously affects the daily life of patients. Therefore, the treatment of KOA is to relieve symptoms, improve functions, delay the process and correct deformities.

KOA is often accompanied by synovial inflammation, which leads to the increase of intra-articular pressure, the obstruction of blood circulation of synovial vein, the decrease of oxygen partial pressure, and then the increase of acid phosphatase and granzyme produced by the inner cells of synovium, which leads to the aggravation of cartilage degeneration. Physical therapy can not only improve local blood circulation, promote the dissipation and absorption of synovitis, relieve spasm, but also reduce intraosseous high pressure and increase oxygen partial pressure, so as to accelerate the metabolism of articular cartilage. Physical therapy can dilate local blood vessels, accelerate local blood circulation, promote tissue metabolism and repair, reduce blood viscosity, reduce the activity of pain causing substances and local stasis, so as to relieve pain. Apoptosis is an independent cell death mode under the control of gene. In the process of the occurrence and development of KOA, apoptosis of chondrocytes plays an important role, and is closely related to the severity of articular cartilage damage. Physical therapy may involve death receptor pathway, mitochondrial pathway and endoplasmic reticulum pathway.

Osteoarthritis is affected by a variety of risk factors, resulting in changes in the internal fiber structure of collagen. In the micro molecular structure, collagen is the same as other proteins. When the change of external conditions destroys the secondary bond to maintain the spatial conformation of protein, the size and conformation of collagen molecules change, denature, and form loose and disordered structure. Under the conditions of pH value, ion concentration and temperature in physiological state, peptide bond will be destroyed by three kinds of enzymes, metalloproteinases, neutral proteinases and lysosomal cathepsins, so as to make peptide chain cleavage. The collagen super helix is stabilized by the intramolecular hydrogen bond formed by any group in different polypeptide chains, although the hydroxyl group in hydroxyproline plays a certain role in the formation of hydrogen bond and the stability of triple helix structure. "Collagen degradation" shows that the percentage content of collagen in bone decreases. However, under high temperature, hydrogen bond is easily destroyed, so that the three-stage spiral structure of collagen molecule disappears, resulting in the change of mechanical properties of collagen and the decrease of bone toughness. The knee joint is generally considered to be a hinge like joint. The size of the medial and lateral condyles of the femur is not the same, which is very similar to a cam. Therefore, in the process of movement of the knee joint, we can find the rhyme, flexion, extension, rotation and rolling of the knee joint. It is necessary to maintain physiological balance and provide stimulation. Proper mechanical load is necessary. On the contrary, excessive mechanical load will cause the formation of 0A. Previous studies have suggested that in patients with ACL injury, the biomechanical changes in the knee joint are more prominent, leading to the decline of the stability of the knee joint, leading to the increase of local cartilage shear stress, so patients with ACL injury are prone to secondary 0A.

2.2. Articular Cartilage

Cell is the basic unit of life. The macroscopic and systematic physiological phenomena of human body should be reasonably explained at the cellular level. The morphological structure and function of cells, the growth, development, maturity, reproduction, aging, death and canceration of cells, the differentiation and regulation mechanism of cells are all related to the mechanical properties of cells. The mechanical properties of human articular cartilage have a profound impact on the growth, maintenance and reconstruction of chondrocytes and cartilage tissue, and are the basis and important influencing factors of chondrocyte engineering and cartilage tissue engineering. As the only constituent cell of cartilage, chondrocyte is the main component of cartilage metabolism. It bears static pressure of body weight and dynamic stress during exercise. As a stress-carrying cell, the realization of its normal physiological function, the initiation and maintenance of growth and proliferation, and the repair process after injury are closely related to its mechanical properties and its mechanical environment.

The changes of chondrocytes in shape and volume can be used as a mechanical signal to regulate their metabolism and functional expression. When chondrocytes are under the mechanical stimulation intensity of normal physiological state, cells can maintain their extracellular matrix in the best condition. Moderately increasing the mechanical stimulation, such as increasing the strength or frequency, can promote the secretion of extracellular matrix; conversely, reducing the mechanical stimulation will reduce the activity of cells; but too low or excessive stimulation will cause cell death. Chondrocytes in different regions of cartilage have different mechanical properties. The change of mechanical stress can lead to the change of tissue osmotic pressure, and then affect the metabolism of chondrocytes in articular cartilage. This may involve changes in the physical properties of the cell membrane or cytoskeleton. In terms of mechanical properties, chondrocytes show the characteristics of viscoelasticity and stability. The instantaneous and average elastic modulus and apparent viscosity of the cells increased significantly in the low permeability environment, but did not change in the high permeability environment. Under low osmotic pressure, the viscoelastic properties of the cells were consistent with the decomposition and recombination of actin.

There are many factors that affect the mechanical properties of cells. In the cell itself, there are mainly cell membrane fluidity, cell membrane actin fibrous gel layer, organelle, cytoskeleton and cytoplasm. Among these factors, cytoskeleton has the greatest influence on the mechanical properties of cells. Inside the cell, there is a very complex network structure system of protein fibers, which is called cytoskeleton. It is a protein fiber grid system in eukaryote. This kind of network system not only plays an important role in maintaining cell morphology and order of cell internal structure, but also plays an important role in cell morphology, cell movement, material transport, energy exchange, information transmission, cell differentiation and transformation. It is this network system that makes chondrocytes have the ability of active deformation and passive deformation resistance.

2.3. Knee Joint Osteoarthritis and Taijiquan

Knee joint is one of the most complex joints in human body. It is an elliptical trochlear joint, which consists of the articular surface of the lower femur, patellar surface and the articular surface of the upper tibia. The trochlear joint of the femur is close to a patella and wrapped by the quadriceps tendon of the femur, which mainly changes the tension line of quadriceps muscle, and prevents the dislocation of the femur and tibia during the flexion of the knee joint. The connecting ligaments mainly include patellar ligament, anterior and posterior sympathetic ligament, tibial collateral ligament, fibular collateral ligament. The femoral tibial joint consists of the corresponding internal and external condylar articular surfaces of the femur and tibia, and the femoral patellar joint consists of the patellar and patellar articular surfaces of the femur. The head of the joint is large and the joint fossa is shallow, which makes the two joint surfaces incompatible and the joint capsule thin and loose. The auxiliary structure of the knee joint meniscus is two fibrocartilage plates which are padded on the inner and outer condyle of the tibia; the medial meniscus is in the shape of "C" and the outer meniscus is in the shape of "O"; the outer edge of the meniscus is thick and the inner edge is thin, which has the functions of deepening the articular fossa, buffering vibration and protecting the knee joint. The pterygoid fold is located in the joint cavity and on both sides below the patella. It is a fatty fold. It fills the joint cavity to increase the stability of the joint and has the function of buffering vibration. The suprapatellar bursa and the deep infrapatellar bursa are located between the quadriceps tendon and the bone surface, which can reduce the friction between the tendon and the bone surface. The ligaments for strengthening the knee joint include the anterior cruciate ligament and the posterior cruciate ligament, which are located in the joint cavity. The two ends of the ligaments are respectively attached to the medial and lateral condyles of the femur and the intercondylar eminence of the tibia to prevent the anterior and posterior displacement of the femur and the tibia. The fibular collateral ligament is located slightly behind the lateral side of the knee joint, from the lateral condyle of the femur to the fibular head, and from the lateral side to strengthen and limit the over extension of the knee joint; The tibial collateral ligament is located in the medial posterior part of the knee joint, from the medial femoral condyle to the medial tibial condyle, to reinforce and limit the over extension of the knee joint from the inside; the patellar ligament is located in the front of the knee joint, which is the continuation of the quadriceps femoris, from the patella to the tibial tuberosity, to reinforce and limit the over flexion of the knee joint from the front.

The movement characteristics of the knee joint is that when the knee joint is fully extended, the tibial intercondylar eminence and the femoral intercondylar fossa are interlocked, and the lateral collateral ligament is tense. Apart from the flexion and extension movement, the femoral tibial joint cannot complete other movements. When the knee is bent, the posterior part of the two sides of the femoral condyles enters the joint fossa, and the interlocking factor is relieved, the collateral ligament is relaxed, so the femoral tibial joint can make slight rotation around the vertical axis. The knee joint has two motion axes: the vertical axis and the frontal axis. The knee joint flexes and extends on the frontal axis, and the knee joint rotates inside and outside slightly around the vertical axis. When the lower leg is extended to a straight line with the thigh, it can no longer be extended due to the limitations of auxiliary devices, so that the thigh and the lower leg become a stable pillar. It is possible to rotate in and out of the vertical axis only when bending, because at this time, the articular surface of the femur changes from the trochlea to the ball, and the collateral ligament is relaxed. However, due to the limitation of the cruciate ligament, the amplitude of both rotation will not be large.

Taijiquan is one of the representative forms of Chinese martial arts. Its form of movement is mainly the continuous and slow coordinated activities of four limbs. It pays attention to the combination of yin and Yang. It is clear about the real and the virtual. At the same time, Taijiquan is also a popular sport to regulate the body and mind. It requires the practitioner to continuously move the body's center of gravity in the single support and double support phase, and at the same time, to coordinate the whole body movement of breathing mind. When practicing Taijiquan, it requires fluency, relaxation and accuracy, and the harmony of breath between movement and stillness. With the increase of the number of Taijiquan practitioners, the number of practitioners with lower extremity joint pain is also increasing in the process of practicing Taijiquan, which is due to diversity. With the growth of age, the rapidly declining balance ability of middle-aged and old people increases their probability of falling. There are more and more cases of accidental falls of middle-aged and old people causing body injuries in today's society. Due to the decline of body function, the old people's trainability is relatively low, but the improvement effect of their muscle strength will not be greatly increased due to the extension of exercise years, which shows that it is not only for the patients in the rehabilitation period, or the old people, but also for the muscle strength of different age groups to adopt appropriate ways and targeted exercise.

3. Experiments Objects and Methods

3.1. Test Subject

In this paper, 64 healthy adult Japanese white rabbits with a weight of 2.5.3 kg, half male and half male, and 48 experimental groups were selected, of which the left side was the experimental side and the right side was the experimental control side, randomly divided into 4 groups, each group of 12 Only, were executed at seven days, fourteen days, twenty-eight days and fifty-six days after surgery. The remaining 16 were blank controls and were executed before surgery. The animals were sacrificed regularly, the bilateral temporomandibular joint specimens were completely removed, placed in 10% neutral formalin solution for 24 hours, and then placed in 10% EDTA solution for decalcification, median sagittal dissection, alcohol Dehydrated, xylene transparent, embedded in paraffin, cut into 3-5um thick continuous slices, HE staining. Observed by Olympus microscope. An analysis of the effects of Taijiquan on knee osteoarthritis patients was selected from 20 patients with knee osteoarthritis during a rehabilitation period in a hospital. The experiment was divided into an experimental group and a blank control group, with 10 cases in each group.

3.2. Experimental Method and Arthritis Model

Sixty four Japanese white rabbits were fed adaptively for one week. All the rabbits were randomly divided into two groups: blank group and model group. No operation was performed in the blank group. The koa model was made by modified Hulth method. The medial approach of the left knee joint was taken to cut the medial collateral ligament, remove the medial meniscus, and cut the anterior cruciate ligament. After 3 days of continuous intramuscular injection of penicillin 200000 units, twice a day, 1 week later, all animals were forced to move for 30 min / h for 16 weeks. The model group was randomly divided into model group (group A), control group (group B) and experimental group (Group C), plus blank group (Group D). The blank group and the model group did not give any intervention; the experimental group animals used shaving machine to scrape the skin hair of the left knee joint, and the two skin electrodes of the knee arthritis treatment instrument were pasted on the inside and outside of the left knee joint to ensure the firm adhesion, and the switch was opened for intervention; the control group animals were shaved, and the TDP treatment instrument was aimed at the left knee joint for intervention; the frequency and frequency of the two groups were consistent. The formulas of mean and standard deviation are as follows:

$$\mu = A_n = \frac{a_1 + a_2 + a_3 + \ldots + a_n}{n} \tag{1}$$

$$\sigma = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(x_i - \mu)^2} \tag{2}$$

In the formula, the values X_1, X_2, X_3, ..., XN (all are real numbers), the average value is μ, and the standard deviation is σ.

4. Ultrastructural Analysis of Articular Cartilage in Patients with Knee Osteoarthritis Due to Microscope

4.1. Activity Analysis of Mitochondrial Respiratory Chain Complex Enzyme in Chondrocytes

Compared with normal chondrocytes, OA chondrocytes showed weaker red fluorescence and stronger green fluorescence. The ratio of red / green fluorescence in normal chondrocytes was 2.59, while that in OA chondrocytes was 1.53, indicating that more mitochondrial membrane in OA chondrocytes was depolarized, and the mitochondrial function in OA chondrocytes was lower than that in normal cells. The quantitative detection of respiratory chain complex enzyme 1, 2, 2 + 3, 4 and ATPase in normal chondrocytes and OA chondrocytes is shown in Table 1.

Table 1. Mitochondiral respiratory chain enzynle complex 1,2,2+3,4,ATPase analysis

Items	E1	E2	E2+3	E4	ATPase
N/(nmol/min mg)	207.76±38.29	161.63±22.68	288.36±17.34	218.83±29.65	193.86±43.64
OA/(nmol/min mg)	180.17±34.83	141.65±22.14	261.56±27.03	194.54±20.58	158.45±22.75
P	0.108	0.196	0.096	0.167	0.147

Quantitative detection of respiratory chain complex enzyme 1 ~ 4 and ATPase showed that the mean variance of the five groups was the same (P = 0.647, 0.694, 0.153, 0.230, 0.173). The content of each enzyme in the normal group was higher than that in the OA group, but the difference was not statistically significant. The analysis results of respiratory chain complex enzyme 1, 2, 2 + 3, 4 and ATPase contents of normal chondrocytes and OA chondrocytes are shown in Figure 1.

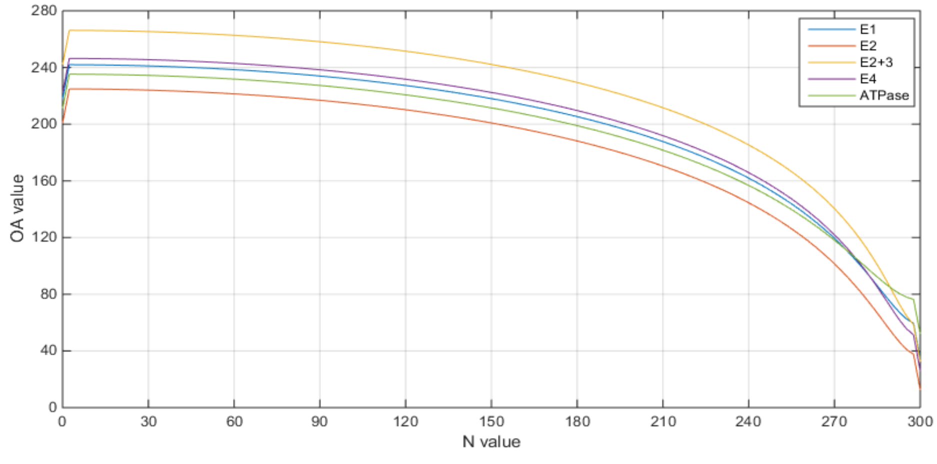

Figure 1. Results of analysis of 1,2,2+3,4 and ATP synthase content of respiratory chain complex of normal chondrocytes and OA chondrocytes

Mitochondrial swelling and outer membrane disintegration will lead to the release of apoptotic factors from the inner and outer membrane of mitochondria into the cytoplasm, which will lead to the subsequent increase of chondrocyte apoptosis, which is one of the important reasons for OA cartilage degeneration. The total mitochondrial content of OA chondrocytes is higher than that of normal cells. Therefore, the compensatory way of the decrease of MRC complex enzyme activity, resulting in the deficiency of electron transfer and ATP production may be realized by the increase of the total mitochondrial content in the chondrocytes. The detection of respiratory chain complex enzyme showed that there was no significant difference in the activity of complex enzyme between OA patients and normal people, but it was lower than that of normal people, which may be related to the small sample size.

4.2. Statistical Analysis of Mankin's Score Standard of Cartilage Histomorphology Changes under Light Microscope

The classification standard statistics of cartilage histological changes are shown in Table 2.

Table 2. Statistics of grading standards of cartilage histology

Group	Eight weeks		Sixteen weeks	
	n	Points	n	Points
A	12	14.127±0.643	10	15.76±0.461
B	12	10.378±0.914	11	12.28±0.773
C	12	9.101±0.756	11	10.627±0.742
D	12	0	12	0.624±0.746

Compared with the blank group, the mandin scores of cartilage histomorphology in model group, experimental group and control group were significantly higher ($P < 0.05$); the mandin scores in experimental group and control group were significantly lower than those in model group ($P < 0.05$); the mandin scores in experimental group were significantly lower than those in control group ($P < 0.05$). The analysis results of cartilage histological changes are shown in Figure 2.

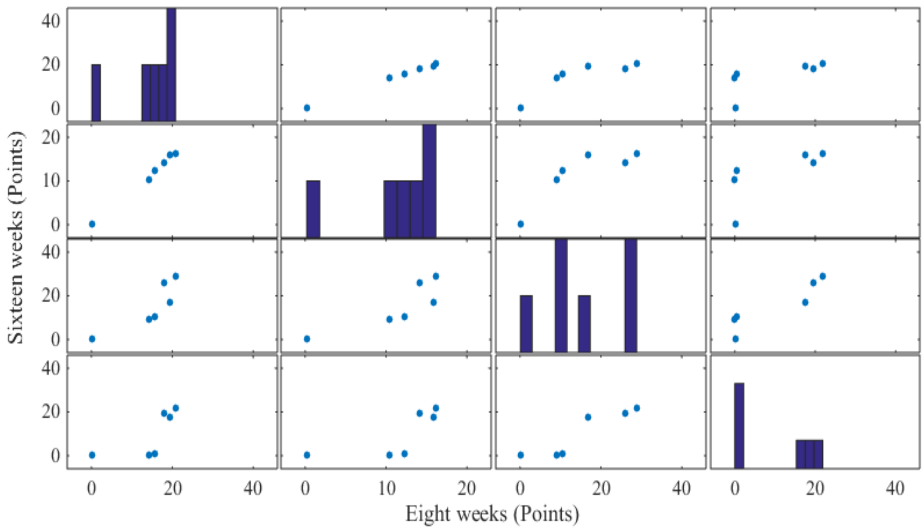

Figure 2. Analysis results of cartilage histological changes

The degeneration of articular cartilage is not only the starting factor of the pathological process of KOA, but also the main pathological feature. Articular cartilage is composed of chondrocytes and cartilage matrix, in which chondrocytes only account for less than 1% of the total volume of cartilage, participating in and regulating the synthesis and degradation of cartilage matrix; cartilage matrix is composed of collagen, proteoglycan and water, providing and maintaining the strength, toughness and hydrophilicity of cartilage. At 16 weeks, compared with 8 weeks, the pathological changes of cartilage tissue were further aggravated, the cartilage layer became thinner, the cartilage membrane was damaged, the number of chondrocytes was significantly reduced, deformation and necrosis were observed.

4.3. Ultrastructural Analysis of Articular Cartilage

The ultrastructure of articular cartilage is shown in Figure 3.

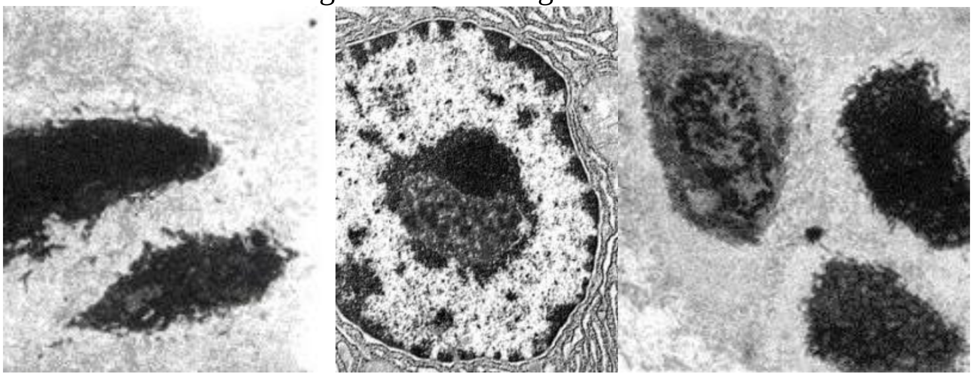

Figure 3. Ultrastructure of articular cartilage

The chondrocytes in the posterior zone of the articular disc are nearly round, and there are many short processes in the cell membrane. There are clear halos and fine type II collagen fibers without periodic striae around the cells. The cells are rich in rough endoplasmic reticulum and Golgi body, as well as lipid droplets and glycogen particles. The double plate area is composed of fibroblasts. The cells are long fusiform or irregular. There are long protuberances in the cell membrane. There are periodic cross striated type I collagen fibers around the cells. There are abundant rough endoplasmic reticulum and Golgi body in the cells, without lipid drops and glycogen particles. After add, round, oval or irregular chondrocytes appeared in the double plate area, with short process, transparent halo around the cells, lipid droplets and glycogen granules in the cytoplasm. Some of the cells have long cell processes and periodic cross striated type I collagen fibers, which have the dual characteristics of fibroblasts and chondrocytes. It was also found that the membrane of some cells was obviously shrunk, the nucleus of some cells was shrunk, the chromatin was patchy or gathered under the nuclear membrane, and the endoplasmic reticulum was obviously expanded, showing the characteristics of apoptotic cells.

4.4. Analysis of the Average Frequency of Surface EMG Signals in Taijiquan

In addition to bending and straightening movement, the knee joint also allows some internal and external rotation and somersault. Because the knee joint bears great stress and is located between two long lever arms of the lower limbs of the body, it is also a relatively vulnerable joint. When muscles are forced for a long time, the excitability of neuromuscular system will gradually decrease with the discharge frequency, and it may also decrease with muscle strength. The results of EMG signal analysis on the left gluteus maximus surface of the two groups of subjects are shown in Figure 4.

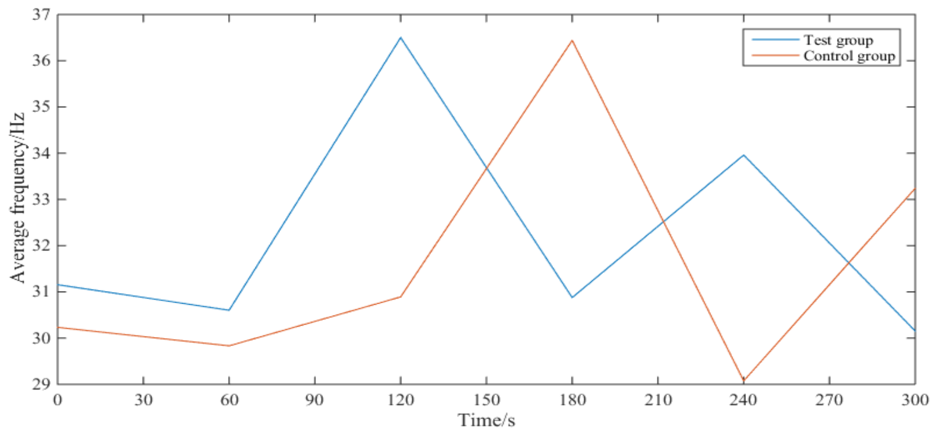

Figure 4. Results of analysis of EMG signals on the left gluteus maximus of the two groups of subjects

The fatigue degree of the two groups was similar. The average frequency of the right gluteus maximus muscle, the discharge frequency of the common group continued to rise from the "rise" and was higher than that of the high-level group. The discharge frequency of the high-level group continued to decline from 100 seconds to 200 seconds, and then rose again after 200 seconds. Therefore, it can only be said that there was a certain amount of fatigue from the "left tail" to the "right foot" and then recovered to a certain extent, This shows that there is no fatigue in the muscle, and the fluctuation of the average frequency is within a reasonable range. The gluteus maximus is in good working condition, which is beneficial for the subject to practice Taijiquan. The gluteus maximus keeps the hip joint and upper body stable, so the balance ability of the practitioner will continue to maintain a good level, the body posture is stable, and will not cause the risk of injury.

Muscle fatigue may be accompanied by the decline of muscle strength, which will directly lead to the decline of the stability of lower limb joints. Unstable lower limb joints are very easy to cause joint injury risk in any sports requiring lower limb participation. Knee joint is the main load-bearing joint of human body, which is very important to human body. It usually receives a lot of external force. In addition, its own anatomical structure has some inherent deficiencies. These factors may be the cause of frequent knee joint injuries.

5. Conclusion

There are many methods of treatment for koa: as a remedy, surgery is affected by many factors, and its application is limited due to the longtime of rehabilitation; although the research of new therapy has made some progress, most of them have not been applied in clinical, and their real potency has not been confirmed. At present, the clinical research of physical therapy still lacks the unified standard of curative effect, there are many kinds, and there is no standardized standard of combined therapy. The ultrastructural analysis of articular cartilage in patients with knee osteoarthritis is expected to provide some help to the etiology and mechanism of knee osteoarthritis.

The mechanical properties of chondrocytes can make the cells respond to the changes of the surrounding mechanical environment, and then adjust the metabolism status to maintain the physiological function of cartilage. However, the abnormal mechanical stimulation can make the chondrocytes produce pathological reaction, the metabolism of cartilage matrix is disordered, and enter the vicious circle of cartilage degeneration and destruction, It eventually leads to osteoarthritis.

There are still some shortcomings in this paper. The effect of mechanical action on the biological properties of chondrocytes is a very complex process, involving the influence of cell type, cell function, cell growth cycle and distribution location. In this paper, we can combine bioreactor to construct tissue culture and further study the biomechanical properties of chondrocytes, which is very useful for the development and application of cartilage repair system.

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Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

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