Cause Analysis and Clinical Manifestation of Knee Osteoarthritis

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Abstract
Osteoarthritis of the knee is more common in clinical, which has a great negative impact on the life and spirit of the patients. However, its pathogenesis and etiology is still not clear. Investigate the treatment of the pathogenesis and etiology of knee osteoarthritis patients has guiding significance. The clinical symptoms and signs (including age, sex, height, weight, medical history, occupation, hobbies, etc.) of 296 patients with knee pain treated of the Municipal People's department of orthopedics hospital from June 2012 to December 2015 were researched. χ^2 tests were conducted and pathogenesis was analyzed. The results showed that most of the patients had knee pain, bone and joint swelling, lower squatting, bone friction sound and other symptoms. The age of 296 cases of knee osteoarthritis patients presented with a normal distribution and the total number of female patients was much higher than the male patients. Incidence was positively correlated with body mass index (BMI), which showed that age, sex, weight, occupation and other factors all affected the incidence of knee osteoarthritis.

Keywords: knee osteoarthritis, cause analysis, clinical manifestation, body mass index.

Introduction
Osteoarthritis (OA, osteoarthritis) is a non-inflammatory disease that occurs due to the proliferation and degeneration of the bone and cartilage of the joint, such as the knee joint and hip joint [1-5], which also called bone and joint disease, hypertrophic osteoarthritis, osteoarthritis, hypertrophic arthritis or degenerative osteoarthritis. [6-11] It represents the aging and degradation of the joint, mainly in the heavy load of spine, hip joint, finger joint, knee joint, etc., in which the knee joint, hip joint disease is the most common. [12]

Osteoarthritis Knee (KOA) is a chronic degenerative joint disease of the knee joint, whose incidence increased with age. The incidence rate of female is higher than that of the male and the knee joint deformation, the pain, the activity were restricted to be the characteristic. [13-15] The main clinical manifestations are joint pain significantly when up and down stairs and in walking time, which can be alleviated according to rest. It may be accompanied by varying degrees of joint effusion at the same time. [19] The femoral arthritis showed a trend of younger in recent years. With the change of population structure and the extension of life expectancy, how to prevent and cure osteoarthritis has become a public health problem in the world. [17] At present it is clear that the biomechanical factor is the main cause of osteoarthritis of the knee, such as the knee joint inflammation, chronic strain or joint local damage caused by knee articular cartilage degeneration. [18] The cartilage cells, extra-cellular matrix and cartilage of the knee joint, the synthesis of the imbalance of the three, leading to joint swelling, deformation and then lead to functional disorders among them made a great impact to the quality of life of patients. [19] X KOA - ray film can be shown as the increase in bone density, the knee joint space narrowing, sclerosis and cystic changes, the tubercular bone fracture, the edge of the joint has a lip - like proliferation. The late showed the articular surface is uneven, the symptoms of bone deformation. If the bone is broken into the joint cavity, it is possible to form a free body in the joint cavity and may result in the formation of joint effusion. [20]

Obesity is another risk factor for osteoarthritis of the knee. Overweight, especially after middle age, has an important influence on the incidence of knee osteoarthritis, especially in the previous 8-12 years. Therefore, with the growth of age, weight should be controlled to avoid overweight. Losing weight can help prevent the occurrence of osteoarthritis. It has been reported that the weight loss of 5kg can reduce the incidence of osteoarthritis of the knee by 50%. [15] The obese patients accounted for a large proportion in the case of knee osteoarthritis, especially in the high incidence of weight bearing joints. Previous studies have indicated that some potential factors, such as obesity, are one of the risk factors of osteoarthritis of the knee. [18] Fat can cause high blood fat, uric acid and other changes in the body's biochemical indicators, and then cause diabetes, high blood pressure and other metabolic related diseases. These diseases may be related to the pathogenesis of osteoarthritis. Studies have shown that 2 per unit of body mass index, the likelihood of progression of osteoarthritis will be reduced by 50%. [20] In addition to the above risk factors, factors cause knee osteoarthritis also includes labor intensity, lifestyle and genetic and other aspects.

Clinical features and related influencing factors of knee osteoarthritis patients were initially analyzed by Shenyanqing.[21] He found that gender, height, weight, menopause, exercise habits and so are all related factors in the pathogenesis of knee osteoarthritis. But it needs further investigation, research and verification. Ye Yongping and others [22] investigated the etiology, X-ray and clinical manifestations of all kinds of knee osteoarthritis and found

that the pathogenesis of knee osteoarthritis is varied. Flugsrud [23] made detailed summary of the knee osteoarthritis of the various clinical symptoms, pathogenesis and related factors and put forward the treatment of knee osteoarthritis of the appropriate treatment and precautions. Bosomworth [24] studied the relationship between exercise and knee osteoarthritis incidence, and analyzed Aioi, shift and complex relationship between the two grams. He pointed out that although exercise is necessary for human life, excessive exercise will induce a variety of lesions, especially the disease of the knee osteoarthritis and it should be advocated a reasonable amount of exercise. The efficacy of sodium hyaluronate in the early diagnosis of knee osteoarthritis after magnetic resonance was evaluated, and a new therapy for knee osteoarthritis was created by Shimin. [25] Zheng Weipeng [26] made detailed study on the arthroscopic knee osteoarthritis manifestations and TCM syndrome type, cell factor correlation and the intervention of traditional Chinese medicine from the molecular point of view to analysis the pathogenesis of osteoarthritis of the knee joint and puts forward some relevant countermeasures. This article starts with the clinical manifestation and the pathological analysis of the knee osteoarthritis patients, and combined with the X ray analysis in order to better understand, analyze and treat the knee osteoarthritis, which provided a useful reference for the treatment of osteoarthritis of the knee.

Material and Methods

Experiment object: We investigated the patients with knee pain in our hospital from June 2012 to December 2015 in this study. Body fat is mostly fat. According to the diagnostic criteria recommended by the American College of Rheumatology knee osteoarthritis of (①most of the time for nearly a month with knee joint pain; ②a bony enlargement;③ aged 38 years old; ④morning stiffness time is less than or equal to 30 min; ⑤bone fricative. Meet ①+③+④+⑤ or ①+②+⑤ or ①+③+⑤can be diagnosed as KOA.) Clinical and radiologic and laboratory standards: ①nearly 1 month most of the time with knee joint pain; ②morning stiffness is less than or equal to 30 min; ③ bone fricative; ④age over 40 years old. ⑤The X-ray showed osteophyte formation; ⑥the joint fluid examination with OA. Meet ①+⑤ or ①+③+⑤+⑥ or ①+④+⑤+⑥the can be diagnosis for KOA) []. Make the exclusion of secondary factors (injury, joint disease, old meniscus injury with long-term joint noose osteonecrosis etc.). Total of 296 cases of osteoarthritis patients were screened including 95 male patients, 201 female patients, the youngest 48 years old, the biggest 75 years old, average age 62 years old and average course is 8.3 years.

Experimental method: Questionnaire investigation: The contents of the questionnaire include patient age, sex, weight, history (such as knee trauma, diabetes, hypertension, gout, rheumatism, etc.), occupation (such as office workers, farmers, unemployed) and sports hobby (such as Tai Chi, dancing, hiking, jogging, swimming, walking, playing, etc.). This experiment labor made intensity classification according to the GB3869-1997 for the investigation of

occupational categories. The first level is less than 15 and the two level is 15~20.The three level is 20~25 and the four level is greater than 25. The greater the index is, the greater the labor intensity. On the contrary, the smaller the labor intensity is. The survey also includes physical examination, disease diagnosis, X-ray (standing or bearing position) is the side of the side of the film check the situation, laboratory tests, etc. Purpose of physical examination is that other non-degenerative knee osteoarthritis patients and metabolic diseases were excluded.

Table 1
Experimental object characteristic

Entry name	Content
Male / female	95 people /201 people
Average age	At the age of 62
Age range	48-75 years old
Mean course of disease	8.3 years

Physiological index detection: The experiment was conducted to measure the height and weight of the patients. BMI values were obtained from patients with body weight / height^2. The content of clinical and biochemical detection includes the determination of total cholesterol, triglyceride, serum calcium, blood glucose of the patients. X ray imaging examination of positive lateral position was conducted patient knee. The knee joint was irradiated with axial X in three degrees: 60 degrees, degrees, 90 degrees and 30 degrees. The knee osteoarthritis was divided into 5 levels According to the lumbar field method: level 0 is the normal and level 1 is bone sclerosis and osteophyte formation. Level 2 is joint space narrowing (less than or equal to 3 mm) and level 3 is joint space disappeared or subluxation. Grade 4 is weight-bearing joints defect (less than or equal to 5 mm) and grade 5 is huge osteophytes, bone serious hardening and wear significantly (> 5 mm).

Clinical symptom: Application of self-made osteoarthritic population survey and knee osteoarthritis severity index (Lequesne mg) was used to conduct clinical grading of outpatients of patients. The clinical manifestations of the patients were divided into five levels According to the score. 1-4 integral and 5-7 score, 8-10 score, 11-13 score, more than 14 points are corresponding to grade 1, 2, 3, 4, 5.

Statistical methods: Data processing used SPSS 15 software. Comparison between groups used χ^2test. Difference has significant meaning when $P< 0.05$.

Result

The distribution of clinical signs and symptoms of knee osteoarthritis: We can see from the table 2 and Figure 2 that the 296 patients with knee joint pain, bone and joint swelling, lower squatting, bone friction sound and other symptoms were observed in the study. The incidence of knee pain symptoms rate was 100% and the symptoms of bone

and joint swelling occurrence rate was 42.9%. Squat difficult symptoms occur rate was 70.6% and bone fricative symptoms occurrence rate was 83.8%.
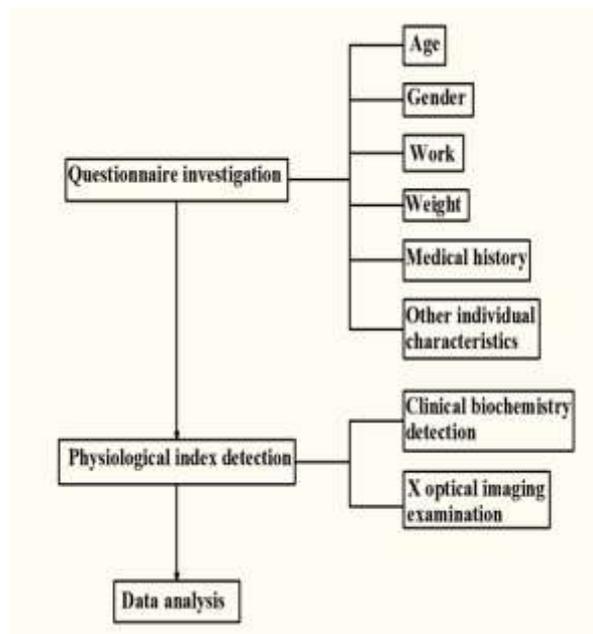

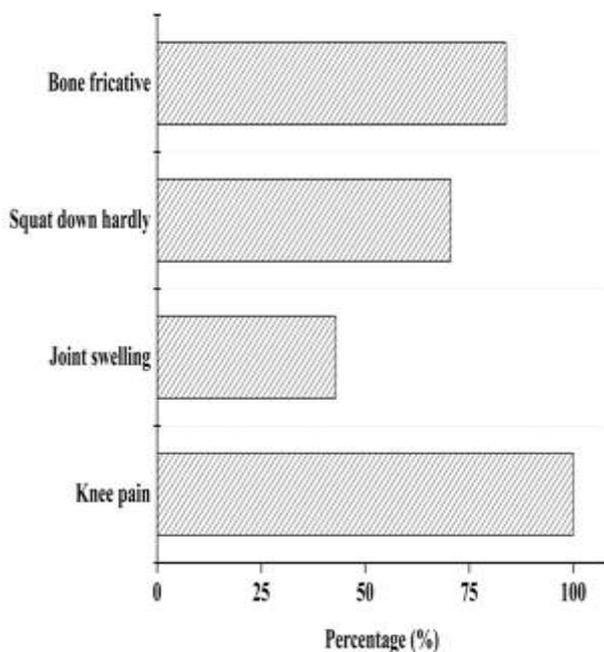**Fig. 1: Experiment and data analysis statistical process**

Fig. 2: Clinical symptoms and signs of 296 cases of knee joint of patients

The age and gender distribution of knee osteoarthritis: The experimental selection of 296 patients was diagnosed with advanced osteoarthritis. All patients underwent total knee arthroplasty. There were 95 male patients and 201 female patients, accounting for 32.1% and 67.9% of the total population. The oldest is 82 years old and the youngest is 48 years old. The average age is 62.6 years old.

Table 2
Clinical symptoms and signs of 296 cases of knee joint of patients

Clinical manifestations	Cases (n = 296)	Percentage (%)
Knee pain	296	100.0
Joint swelling	127	42.9
Squat down hardly	209	70.6
Bone fricative	248	83.8

Table 3
Age and gender composition of 296 cases of knee joint of patients

Age (years old)	Male		Female		Total	
	Cases	Percentage (%)	Cases	Percentage (%)	Cases	Percentage) %)
≥80	3	1	5	1.7	8	2.7
71~80	32	10.8	57	19.3	89	30.1
61~70	42	14.2	86	29.1	128	43.3
51~60	16	5.4	46	15.5	62	20.9
≤50	2	0.6	7	2.4	9	3.0

It can be seen from table 3 that 71 year old patients accounted for 30.1%, 61-70 years old patients accounted for 43.3%, 51-60 years old patients accounted for 20.9%, and more than or equal to 80 years old patients accounted for only 2.7%, less than or equal to 50 patients only accounted for 3.0%.The patients with 61~80 years old was significantly higher than other age patients. Figure 3 shows that whether it is male or female, the incidence of osteoarthritis of the knee is mainly in the age of 50~80. The law of normal distribution is presented in general. It can also be seen from the table 3 and figure 3 that male patients accounted for 32.1% and female patients accounted for 67.9%. The total number of female patients was significantly higher than that of male patients, and the difference was statistically significant (P < 0.01).

Effect of BMI index on the prevalence of knee osteoarthritis: It can be seen that visible from table 4 and Figure 4 that patients with BMI > 26 accounted for 46.9% and patients with BMI in 23.9~26 accounted for 29.1% in this study, 296 patients with knee osteoarthritis. The BMI is more than 23.9 overweight patients accounted for 76%.And other non-overweight people (BMI < 23.9) were a total of only 24%. It can be concluded that overweight people are significantly higher than those in non-overweight group.

Examples and comparison of knee osteoarthritis patients before and after treatment: X light sheetof the knee joint of a patient with osteoarthritis of the knee is shown in Figure 5, who was diagnosed with chronic synovitis of knee varus deformity, knee degenerative osteoarthritis, knee joint. The hospital immediately supplied for patients with implementation of the left knee joint clean-up operation, the left knee joint around the soft tissue release operation, the left knee joint replacement after determining the diagnostic

report.The pain disappeared and the activity was lower in the second half of the operation. We can see from the comparison of figure 5 before and after treatmentthatthe knee joint of the patient was obviously improved aftertreatments, which was close to the normal knee joint.
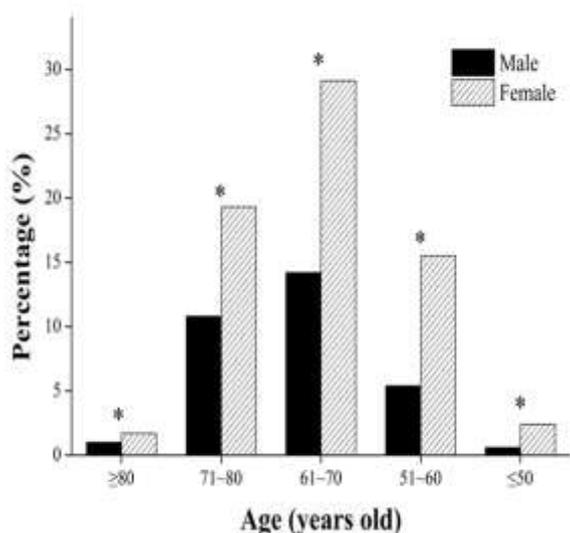

Fig. 3: Age and gender composition of 296 cases of knee joint of patients

Table 4
Composition distribution between knee osteoarthritis and body mass index (BMI)

BMI	Male		Female		Total	
	Cases	Percentage (%)	Cases	Percentage (%)	Cases	Percentage (%)
>26	47	15.9	92	31.0	139	46.9
23.9~26	29	9.8	57	19.3	86	29.1
18.5~23.9	15	5.1	44	14.9	59	19.9
<18.5	4	1.4	8	2.7	12	4.1
Total	95	32.1	201	67.9	296	100
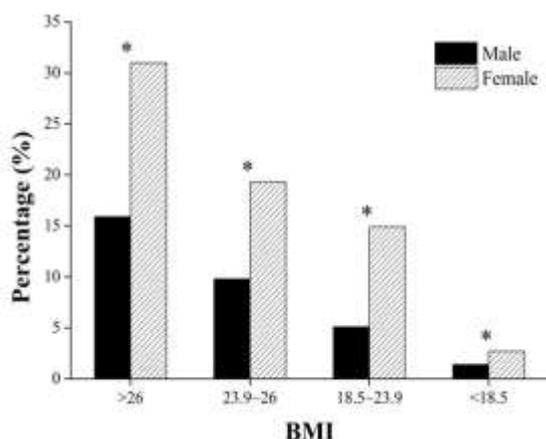
Fig. 4: Composition distribution between knee osteoarthritis and body mass index (BMI)

Before treatment   After treatment

Fig. 5: The comparison of symptoms examples of patients between before treatment and after treatment

Discussion

296 patients with knee osteoarthritis of the knee joint replacement patients were investigated, and found that all patients had symptoms of knee pain in this study. There are also some patients appeared squatting difficulties, bone fricative, joint swelling and other symptoms. The late stage of the knee joint is prone to deformity (O type leg or X leg), and even cause patients to stand and walk difficult due to the long course of the disease,, which affects the patient's mental health seriously resulting in anxiety and even depression. At the same time, it leads to muscle atrophy, joint stiffness and other symptoms due to the long-term immobilization of the affected limb, which has caused serious inconvenience to the patient's daily life and needs the relevant effective treatment to alleviate the various difficulties of the knee osteoarthritis patients. Therefore, the first is to reduce joint pain, restore the body function and reduce disability rate so that patients restore confidence and improve the quality of life of patients in the treatment. [5]

Age is the biggest risk factor in the cause of disease. The survey showed that the incidence of osteoarthritis and age showed a positive correlation trend. The aging of the body makes the cell's ability to proliferate with the age increasing. Cartilage cells decreased growth factor for promoting repair, which leaded to functional cells can't be updated. The hydrophilic polysaccharides decreased, which resulted in the decrease of cartilage and the degeneration of articular cartilage. [23] However, many patients do not have enough vigilance in the young due to the early symptoms of this disease is not obvious, which leaded to disease is not in the early control to the elderly in the late state.

Gender and obesity are also important factors in the pathogenesis of knee osteoarthritis. The data obtained in this experimental investigation showed that the incidence rate of female was significantly higher than that of male in the same age group. [20] This factor may be related to women's career, such as a salesperson, a textile worker, and so on. In

addition, it has been confirmed that there are estrogen receptors (α、β)in many animal articular chondrocytes and growth plate chondrocytes, which fully indicates that the articular cartilage is the target tissue of estrogen. [6, 9, 17] Overweight has an important effect on the incidence of osteoarthritis of the knee, especially after middle age. In particular, it was the 8-12 year before symptoms appearing. Therefore, with the growth of age, more weight should be controlled to avoid overweight. Losing weight can help prevent the occurrence of osteoarthritis. It has been reported that the weight loss of 5kg can reduce the incidence of osteoarthritis of the knee by 50%. [15] The obese patients accounted for a large proportion in the case of knee osteoarthritis,, especially in the high incidence of weight bearing joints. Previous studies have indicated that some potential factors, such as obesity, are one of the risk factors of osteoarthritis of the knee. [18] Fat can cause high blood fat, uric acid and other changes in the body's biochemical indicators, and then cause diabetes, high blood pressure and other metabolic related diseases. These diseases may be related to the pathogenesis of osteoarthritis. Studies have shown that 2 per unit of body mass index, the likelihood of progression of osteoarthritis will be reduced by 50%. [20] In addition to the above risk factors, the factors to cause knee osteoarthritis also include labor intensity, lifestyle and genetic and other aspects.

The articular cartilage became thinner, the number of cell division was decreased, the rate of protein synthesis was decreased, and the collagen type II collagen and matrix were decreased after removal of the ovaries. Taking estrogen may delay the onset of OA in the knee joint. [6, 9, 17] Increased body weight increases the incidence of osteoarthritis of the knee after middle age. It can be seen from the data collected in this experiment that with the increase in the incidence rate, body mass index is also gradually increased. This conclusion is consistent with the results of previous literature. Being overweight increases the load of the load bearing joints and promotes cartilage damage. And obesity can be induced osteoarthritis of the knee by the intermediate product of the metabolic process. [9] Thus reducing weight is helpful in the prevention of osteoarthritis. It has been reported that the incidence of knee osteoarthritis can be reduced by 50% for each weight loss of 5 kg [22]. At the same time, obesity can also change the uric acid, blood lipids and other biochemical indicators, and then cause hypertension, diabetes and other metabolic diseases. And the occurrence of these diseases is likely to have a certain correlation with the incidence of knee osteoarthritis. Therefore, it is very obvious clinical significance to find the various factors that induce the incidence of knee osteoarthritis.

It leads to the occurrence of osteoarthritis of the knee because of the heavy load on the knee joint is more serious. The risk of knee osteoarthritis was significantly increased in race athletes, football players, and other professional athletes with high strength and high strength in knee length. Moderate and habitual exercise without damage to the joints did not increase the risk of osteoarthritis. Men who need to kneel, squat, or lift weights in their work will be two or three times more risk of knee osteoarthritis than men who don't do the work. Studies have indicated that it is easy to lead the occurrence of osteoarthritis of the knee that to be engaged in the work of bending the knees and lifting weights. Therefore, you should minimize the length of the time of upper and lower steps, running and other high strength knee weight bearing exercise in order to avoid and reduce the wear and tear of articular cartilage. And take care not to be in a position for a long time in your daily life.

In addition, genetic and lifestyle aspects are also risk factors for knee osteoarthritis. Osteoarthritis of the knee is a chronic progressive disease, which affects the quality of life. It is very important to prevent the occurrence of the disease, to reduce the morbidity and to delay the time of total knee arthroplasty. We can prevent the disease from eating regulation, physical exercise, psychological adjustment and so on. Dietary aspect: the pressure of the joint increased, the wear and tear of articular cartilage increased once more than the standard weight because obesity is an important cause of the disease. Obesity appropriate control of diet and pay attention to adjust the diet structure to maintain a balanced diet and reduce calorie intake. Make weight control in the appropriate range in order to reduce the pressure on the knee and the degree of wear. Diet should pay attention to eat calcium and vitamin C, vitamin E, eat dairy products (such as milk, yogurt, cheese), bean products, such as soya bean milk, soy, tofu, Yuba, vegetables (such as the day lily, carrots, Chinese cabbage, small rape) and seaweed, kelp, fish, shrimp and other seafood, and sun and vitamin D in order to promote calcium absorption. When necessary, a proper amount of calcium supplements. Functional exercise: adhere to the appropriate amount of physical exercise, regular exercise can strengthen the muscles, legs and ligaments support the role of the joint to help protect the joint fly to prevent osteoporosis, prevent the occurrence of osteoarthritis. However, physical exercise should avoid long standing and long distance walk, because the unreasonable exercise will increase the joint load, accelerate the degeneration of the joint. Try to avoid long-distance running, mountain climbing, squatting and other sports items.

Conclusion

Osteoarthritis of the knee has a great negative impact on the life and spirit of the patients and the incidence rate is high. But its pathogenesis and the exact cause is still not clear. Investigate the treatment of the pathogenesis and etiology of knee osteoarthritis patients has guiding significance. The clinical symptoms and signs (including age, sex, height, weight, medical history, occupation, hobbies, etc.) of 296 patients with knee pain treated of the Municipal People's department of orthopedics hospital from June 2012 to December 2015 were researched. χ^2 tests were conducted using SPSS 15 software and pathogenesis was analyzed. The results showed that most of the patients had knee pain, bone and joint swelling, lower squatting, bone friction sound and

other symptoms. The age of 296 cases of knee osteoarthritis patients presented with a normal distribution and the total number of female patients was much higher than the male patients. Incidence was positively correlated with body mass index (BMI), which showed that age, sex, weight, occupation and other factors all affected the incidence of knee osteoarthritis. It provides theoretical support for the clinical treatment of knee osteoarthritis patients, and has a wide range of application value.

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