# Clinical efficacy and pharmacological mechanism analysis of Xubi Capsule in the treatment of patients with liver and kidney deficiency osteoarthritis

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**Abstract**

To explore the clinical efficacy and pharmacological mechanism analysis of Xubi capsule in the treatment of patients with liver and kidney deficiency osteoarthritis (OA). In this single-center retrospective study, 120 patients with liver and kidney deficiency OA admitted to the Hangzhou Fuyang Hospital of Traditional Chinese Medicine from January 2020 to May 2022 were included, and patients were divided into the intervention group (n = 60) and the control group (n = 60) according to their treatment. The control group was treated with Ibuprofen, while the intervention group was treated with Xubi capsule combined with Ibuprofen. According to the network pharmacology method, the mechanism of the Xubi capsule in the treatment of patients with liver and kidney deficiency OA was analyzed. After the treatment, the total effective rate in the intervention group was 93.33%, which was significantly higher than that in the control group ($P < .001$). After treatment, compared with the control group, the degree of joint swelling and tenderness in the intervention group were lighter, the muscle strength was better, the level of erythrocyte sedimentation rate was lower, and the pain visual score was lower ($P < .05$), while the C-reactive protein level was significantly lower ($P < .001$). The effective chemical composition of Xubi capsules is 176, with quercetin and palmitoleic acid being the most associated with diseases. There are 209 intersection targets between drugs and diseases. A total of 119 gene ontology cellular components were significantly enriched. The combination of traditional Chinese medicine and Western medicine adopted in this study can effectively treat patients with liver and kidney deficiency OA and relieve the joint pain of patients. In a multicomponent and multitarget approach, the Xubi capsule breaks through the limitations of traditional nonsteroidal anti-inflammatory drugs and has good clinical application value.

**Abbreviations:** CRP = C-reactive protein, ESR = erythrocyte sedimentation rate, OA = osteoarthritis, VAS = visual analog pain scale.

**Keywords:** efficacy, liver and kidney deficiency type, osteoarthritis, pharmacological, Xubi capsule

## 1. Introduction

Osteoarthritis (OA) is a degenerative disease of bone and joint. Its clinical symptoms include joint cartilage degeneration, joint pain, and so on. In severe cases, it can lead to disability in patients, causing inconvenience to their lives and affecting their quality of life.[1–3] The pathogenic factors of OA include genetics, environment, hormones, and so on, but the specific pathogenic mechanism is still unclear. In recent years, there have been various Western drugs targeting OA, but long-term use can lead to some adverse reactions, making it difficult for patients to persist in taking them.[4–6] In clinical practice, doctors should provide the optimal treatment plan based on

the specific situation of patients while actively educating and guiding them to undergo appropriate functional exercise. Nevertheless, there are still some patients whose results are not ideal. The diagnosis of traditional Chinese medicine is more sophisticated and has unique advantages compared to Western medicine.

From the perspective of traditional Chinese medicine, OA belongs to the category of "Bi syndrome" and is caused by the invasion of external pathogens. So far, there is no better method for Western medicine to completely cure OA, and relying solely on traditional Chinese medicine cannot effectively control the condition of OA. Therefore, the advantages of combining traditional Chinese and Western medicine are

evident, and the combination of traditional Chinese and Western medicine can better control and alleviate the condition.[7–9] Xubi capsule is a traditional Chinese patent medicine and simple preparations. It can nourish the liver and kidney, dispel wind and dampness, and has the effect of dredging collaterals. It is used in OA and other diseases. We hypothesized that Xubi capsule therapy combined with Western medicine therapy could control and alleviate the progression of osteoarthropathy. So, the study combines the treatment of Xubi capsule with the treatment of Western medicine, and analyzes its pharmacological mechanism, to provide some clinical references for the treatment of patients with liver and kidney deficiency OA.

## 2. Materials and methods

### 2.1. Study design and ethical statement

This single-center retrospective study was conducted in Hangzhou Fuyang Hospital of Traditional Chinese Medicine from January 2020 to May 2022 to explore the clinical efficacy and pharmacological mechanism analysis of Xubi Capsule in the treatment of patients with liver and kidney deficiency OA. Inclusion criteria: age greater than or equal to 40 years old; the selection of patients meets the diagnostic requirements of traditional Chinese and Western medicine for OA; before enrollment, there were no abnormalities in the patient's liver and kidney functions; and the patient is aware of the relevant content of the study and voluntarily signs an informed consent form. Exclusion criteria: under the age of 40 or over the age of 75; the patient has liver and kidney diseases, as well as malignant tumors; the patient belongs to pregnant or lactating women; has taken more than 10 mg of glucocorticoids or related biological agents 30 days before treatment; the patient has rheumatic immune disease; the patient is allergic to the drug allergy under study; the patient has a mental illness; the patient has taken traditional Chinese patent medicines and simple preparations with similar efficacy to the study drug for a long time; and the patients do not cooperate with treatment and have poor compliance. The present study was approved by the Ethics Committee of Hangzhou Fuyang Hospital of Traditional Chinese Medicine (November 17, approval no.202301B17).

### 2.2. Sample size estimation

According to the prevalence of the disease, the sample size was computed by using the formal: $n = Z^2(p*q)/d^2$. Take $Z = 1.96$, where p is the overall rate, $q = 1-p$. Let $p = .8$, d is a fraction of p. Finally, a total of 129 patients in our hospital were selected, 9 were excluded, and 120 patients were divided into control group (n = 60) and intervention group (n = 60). A researcher who did not know the protocol in detail recorded the data.

### 2.3. Treatment methods

In the control group, patients adopted Western medicine therapy and took Ibuprofen orally twice a day, 0.3 g each time. During the treatment of the intervention group, in view of the treatment method of the control group, Xubi capsules were taken 3 times a day, with 5 capsules taken at a dose of 0.55 g per capsule. The ingredients of Xubi capsules include raw Rehmannia glutinosa, cooked Rehmannia glutinosa, white peony, Radix Angelicae Sinensis, Stretching Tendon Grass, Epimedium Epimedii, Rhizoma Drynariae, Rhizoma Drynariae, Rhizoma Anemarrhenae, Lamb Bone, Weilingxian, Fangfeng, prepared dog spine, osmanthus twig, safflower, and prepared aconite. The treatment time for the control group and intervention group was 12 weeks, and relevant data of patients were recorded during the treatment period to observe the therapeutic effect. During treatment, it is necessary to pay attention to a light diet and avoid spicy foods.

### 2.4. Observation indicators

During the treatment process, count the number of tender joints and swelling joints of the patient to understand their related tenderness and swelling conditions. Observe the patient's morning stiffness time and muscle strength.[10–12] Choose the visual analog pain scale (VAS) to rate the intensity of pain perception in patients, using a percentile scale. The higher the score, the stronger the patient's pain sensation.[13–15] After venous blood collection, the patient's erythrocyte sedimentation rate (ESR) is detected. By observing the value of ESR, the patient's disease control of OA can be judged. The higher the level of C-reactive protein (CRP) detected, the more active the disease is. Detect the changes in immune function indicators of patients and collect fasting elbow vein blood from patients, with a collection volume of 5 mL. After centrifugation, take the supernatant for pretreatment. The changes of T helper cell (Th) 17 and regulatory T cells (Treg) were measured by flow cytometry. According to the disease activity score (DAS) of 28, the efficacy of DAS28-ESR was analyzed. The higher the DAS28-ESR score, the more obvious the patient's OA activity is.[16–18] Select the Crohn's disease activity index (CDAI) to score the patient's disease activity. The higher the score, the more active the patient's OA is. After evaluating the therapeutic effect, if the patient's main symptoms and signs disappear or basically disappear, and their functional impairment returns to normal with an improvement rate of over 75%, it is determined to be significantly effective. The main symptoms and signs of the patient show significant improvement, and the dysfunction shows significant improvement. If the improvement rate exceeds 50%, it is considered effective. If the patient's main symptoms and signs have improved to a certain extent, and their functional impairment has improved to a certain extent, and the improvement

**Table 1**

Comparison of general information between two groups.

| Items | Intervention group (n = 60) | Control group (n = 60) | P |
|---|---|---|---|
| Gender | | | 0.535 |
| Male | 44 (73.33%) | 48 (80.00%) | |
| Female | 16 (26.67%) | 12 (20.00%) | |
| Age (year) | 57.28 ± 14.46 | 51.15 ± 13.47 | 0.098 |
| Course of disease (month) | 40.89 ± 27.57 | 46.49 ± 24.56 | 0.279 |
| Height (cm) | 160.87 ± 9.56 | 159.48 ± 7.09 | 0.348 |
| Body weight (kg) | 60.31 ± 14.54 | 58.69 ± 7.08 | 0.384 |
| Smoking history | 17 (28.33%) | 18 (30.00%) | 0.178 |
| History of drinking | 14 (23.33%) | 15 (25.00%) | 0.203 |
| Strong tea diet | 10 (16.67%) | 23 (38.33%) | 0.318 |
| Coffee diet | 19 (31.67%) | 18 (30.00%) | 0.212 |

**Comparison of joint status between two groups.**

| Time | Joint swelling | Joint tenderness | Morning stiffness time | Myodynamia |
|---|---|---|---|---|
| Before treatment | | | | |
|   Intervention group (n = 60) | 6.31 ± 3.38 | 6.91 ± 3.11 | 89.67 ± 16.03 | 22.15 ± 7.54 |
|   Control group (n = 60) | 6.62 ± 4.25 | 6.87 ± 4.76 | 88.81 ± 16.62 | 22.17 ± 7.91 |
|   P | .719 | .452 | .814 | .989 |
| After treatment of 4 weeks | | | | |
|   Intervention group (n = 60) | 2.97 ± 2.69*** | 2.96 ± 2.54*** | 53.28 ± 12.25*** | 28.38 ± 6.49*** |
|   Control group (n = 60) | 4.47 ± 3.17* | 4.93 ± 2.28* | 68.12 ± 11.49*** | 25.23 ± 6.61* |
|   P | .025 | <.001 | <.001 | .01 |
| After treatment of 12 weeks | | | | |
|   Intervention group (n = 60) | 1.88 ± 1.47*** | 1.76 ± 1.46*** | 38.20 ± 10.26*** | 32.45 ± 8.12*** |
|   Control group (n = 60) | 2.84 ± 1.86*** | 2.67 ± 1.79*** | 44.69 ± 11.30*** | 28.79 ± 7.84*** |
|   P | .012 | .015 | .009 | .013 |

*Compared with the same group before treatment, $P < .05$.

***Compared with the same group before treatment, $P < .001$.

**Comparison of ESR between two groups.**

| Time | ESR |
|---|---|
| Before treatment | |
|   Intervention group (n = 60) | 44.02 ± 32.31 |
|   Control group (n = 60) | 44.15 ± 19.61 |
|   P | .983 |
| After treatment of 4 weeks | |
|   Intervention group (n = 60) | 25.45 ± 11.57* |
|   Control group (n = 60) | 36.48 ± 14.23** |
|   P | <.001 |
| After treatment of 12 weeks | |
|   Intervention group (n = 60) | 17.79 ± 11.76*** |
|   Control group (n = 60) | 23.58 ± 8.17*** |
|   P | .013 |

*Compared with the same group before treatment, $P < .01$.

**Compared with the same group before treatment, $P < .05$.

***Compared with the same group before treatment, $P < .001$.

### 2.7. Construction of protein–protein interaction network and extraction of core targets and gene ontology functional enrichment analysis

It sets the source of target genes, takes a confidence score of 0.4, and obtains protein interaction relationships through the STRING database in view of the intersection target information obtained, thereby obtaining relevant action information files. Then it is imported into Cytoscape 3.9.1 software for drawing the protein–protein interaction (PPI) network. It is optimized through topology analysis, and core targets are screened under conditions such as compactness. According to the target, gene ontology (GO) function enrichment analysis is conducted through the Metascape platform.

### 2.8. Statistics analysis

Data analysis was done using SPSS 26.0 software. The count data were expressed by (n, [%]) and compared by $\chi^2$ test, the measurement data were expressed by mean ± standard deviation (SD) and compared by $t$ test. $P < .05$ was considered to be statistically significant.

## 3. Results

### 3.1. Comparison of general information

As shown in Table 1, there were no statistically significant differences between the 2 groups in terms of gender, age, course of disease, height, weight, smoking history, or alcohol consumption ($P > .05$).

### 3.2. Comparison of joint status

As shown in Table 2, before treatment, there was no significant difference between the 2 groups ($P > .05$). After 4 weeks of treatment, the intervention group had lighter joint swelling and better muscle strength ($P < .05$) and had lighter joint tenderness and shorter morning stiffness time when compared with the control group ($P < .05$). After 12 weeks of treatment, the intervention group showed milder joint swelling and tenderness, better muscle strength ($P < .05$), and significantly shorter morning stiffness time when compared with the control group ($P < .01$). Compared to before treatment, after 4 and 12 weeks of treatment, the degree of joint swelling and tenderness in the intervention group were milder, and the time of morning stiffness was shorter ($P < .001$).

### 3.3. Comparison of erythrocyte sedimentation rate level

As shown in Table 3, before treatment, there was no significant difference between the 2 groups of patients ($P = .983$).

rate exceeds 30%, it is determined to be improved. The main symptoms of the patient have not been significantly improved, and their dysfunction has not been significantly alleviated; with an improvement rate of less than 30%, it is determined to be invalid.

### 2.5. Screening and target extraction of effective components of Xubi Capsules

It selects multiple tools, such as the Traditional Chinese Medicine Information Database, CNKI, and SwissADME to search and screen the relevant medicinal ingredients of Xubi capsules and obtain the relevant chemical components. It has drug-like properties and is well utilized orally, and corresponding target genes are obtained. It is screened in the protein database to obtain corresponding information and standardized naming.

### 2.6. Osteoarthritis target extraction

It selects databases such as GeneCards to search for OA disease targets and obtain relevant targets. Through the Drugbank database, OA drug therapy genes are searched for, and a set of relevant targets is obtained. Gene name correction is performed in the Uniprot database, and the work of deduplication and gene information database construction is carried out. It compares it with the drug target gene and displays the relevant comparison results through the Wayne diagram.
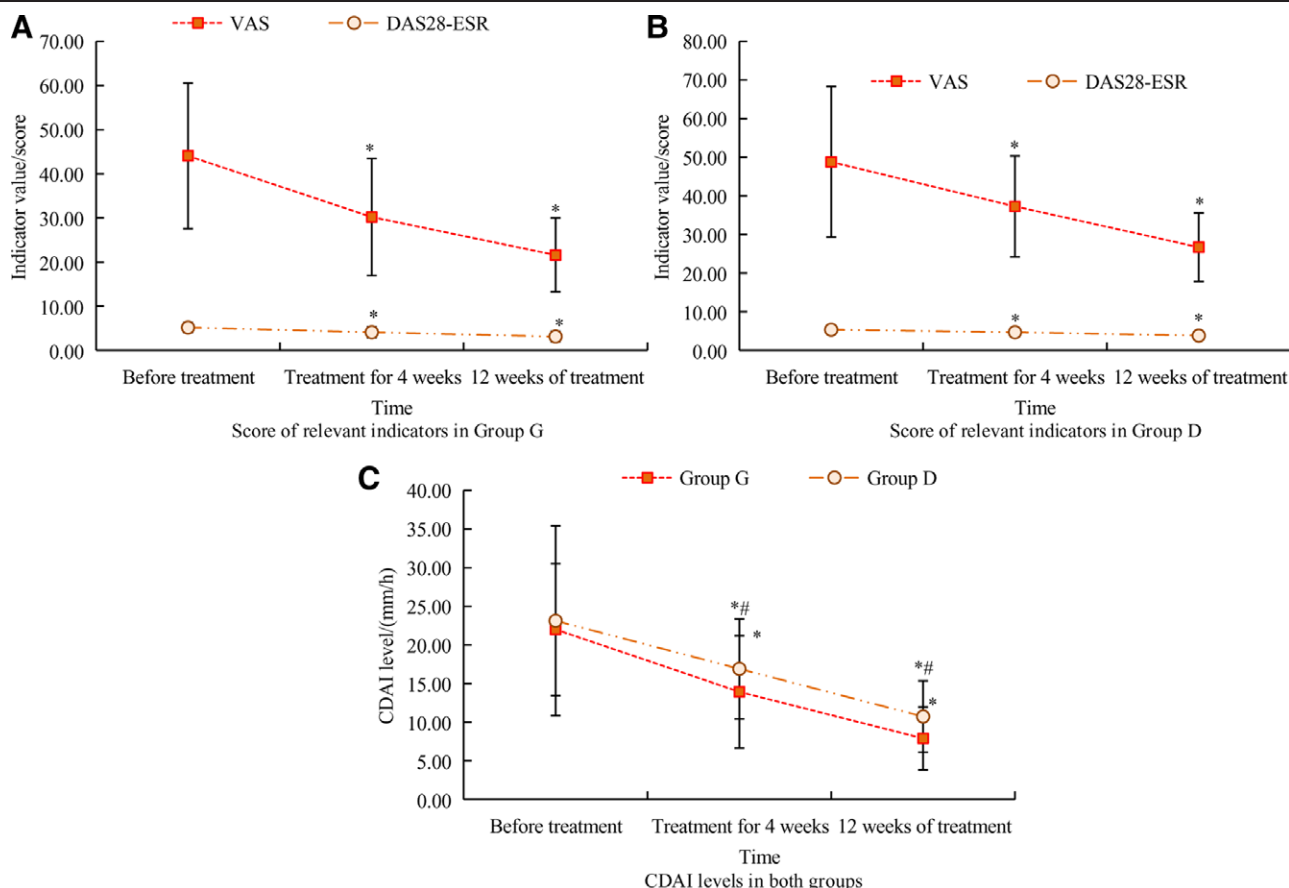
Figure 1. Comparison of VAS score, CDAI indicators, and DAS28-ESR between two groups. (A) VAS and DAS28-ESR in the intervention group. (B) VAS and DAS28-ESR in the control group. (C) CDAI. *compared with the same group before treatment, P < .05; # compared with the control group, P < .05. CDAI = Crohn's disease activity index, DAS28-ESR = disease activity score of 28-erythrocyte sedimentation rate, VAS = visual analog pain scale.

**Table 4**

**Comparison of CRP and immune function between two groups.**

| Items | Before treatment | After treatment | P |
|---|---|---|---|
| CRP (mg/L) | | | |
| Intervention group (n = 60) | 28.29 ± 7.68 | 14.52 ± 4.69 | <.001 |
| Control group (n = 60) | 27.19 ± 7.43 | 19.31 ± 5.01 | <.001 |
| P | .261 | <.001 | |
| Th17 (%) | | | |
| Intervention group (n = 60) | 2.16 ± 0.41 | 1.31 ± 0.11 | <.001 |
| Control group (n = 60) | 2.25 ± 0.35 | 1.74 ± 0.20 | <.001 |
| P | .068 | <.001 | |
| Treg (%) | | | |
| Intervention group (n = 60) | 0.33 ± 0.07 | 1.56 ± 0.12 | <.001 |
| Control group (n = 60) | 0.34 ± 0.11 | 1.03 ± 0.09 | <.001 |
| P | .402 | <.001 | |
| Th17/Treg | | | |
| Intervention group (n = 60) | 5.67 ± 1.23 | 0.84 ± 0.18 | <.001 |
| Control group (n = 60) | 5.43 ± 1.27 | 1.68 ± 0.32 | <.001 |
| P | .138 | <.001 | |

After 4 weeks of treatment, the intervention group had lower ESR levels when compared with the control group (P < .001). After 12 weeks of treatment, the intervention group had lower ESR levels when compared with the control group (P = .013). Compared to before treatment, the ESR level in the intervention group was lower after 4 and 12 weeks of treatment (P < .01).

### 3.4. Comparison of visual analog pain scale score, Crohn's disease activity index indicators, and disease activity score of 28-erythrocyte sedimentation rate

As shown in Figure 1, as the treatment time increased, the VAS score and DAS28-ESR levels of both groups of patients improved. Compared before treatment, VAS scores and DAS28-ESR levels

**Table 5**

Comparison of clinical efficiency between two groups.

| Items | Intervention group (n = 60) | Control group (n = 60) | P |
|---|---|---|---|
| Significantly effective | 34 (56.67) | 20 (33.33) | |
| Effective | 20 (33.33) | 22 (36.67) | |
| Improve | 2 (3.33) | 2 (3.33) | |
| Invalid | 4 (6.67) | 16 (26.67) | |
| Total effective rate | 56 (93.33) | 44 (73.33) | <.001 |

**Table 6**

Effective chemical constituents of Xubi capsules as single herb.

| Source of compound | Drynaria, safflower, epimedium | Cinnamon twig and saponin thorn | Safflower, epimedium, saponium horn thorn | White peony, angelica, fangfeng, bone shredded Bun, Cinnamomum Cinnamomum, Safflower, Weilingxian, Dipsacus, Saponin horn thorn | Paeonia lactiflora, Fangfeng, Cinnamomum cassia, Shenjin Grass, Raw Rehmannia glutinosa, Cooked Rehmannia glutinosa, Dipsacus aspera, Epimedium, Saponin horn thorn, Prepared Aconite |
|---|---|---|---|---|---|
| Effective fraction (number) | 1 | 2 | 1 | 1 | 1 |
| Source of compound | White peony, bone fragmented root, epimedium, safflower, saponin thorn, anemarrhena asphodeloides | Bone Fragmented Bun, Safflower, Streptomyces, Raw Rehmannia, Cooked Rehmannia, Weilingxian, Zaojiao thorn, Anemarrhena asphodeloides | White peony, bone fragmented root, cinnamon twig | Safflower, Epimedium | Duhuo, Windproof |
| Effective fraction (number) | 1 | 1 | 1 | 1 | 2 |
| Source of compound | Bone Fragmentation Bu, Saponin Horn Sting | Bone Fragmentation and Dog Spine Preparation | Epimedium, Anemarrhena asphodeloides | White peony | Caulis Lonicerae |
| Effective fraction (number) | 1 | 1 | 1 | 9 | 6 |
| Source of compound | Windbreak | Rhizoma Drynariae | Cassia twig | Safflower | Lycopodium clavatum |
| Effective fraction (number) | 14 | 11 | 2 | 16 | 3 |
| Source of compound | Weiling Xian | Teasel root | Epimedium | Sheep bone | Spina gleditsiae |
| Effective fraction (number) | 5 | 6 | 17 | 21 | 3 |
| Source of compound | Anemarrhena asphodeloides | Preparation of aconite | | Rhizoma cibotii | |
| Effective fraction (number) | 12 | 20 | | 16 | |

improved in the control group and the intervention group after 4 and 12 weeks of treatment ($P < .05$), and the improvement in VAS scores and DAS28-ESR levels in the intervention group was more significant ($P < .05$).

### 3.5. Comparison of C-reactive protein indicators and immune function

As shown in Table 4, the Th17 ratio and Th17/Treg values in both groups decreased, while the Treg cell ratio increased ($P < .001$). Additionally, the improvement in CRP and related immune function indicators in the intervention group was more significant ($P < .001$).

### 3.6. Comparison of the total clinical efficiency

As shown in Table 5, after treatment, the total effective rate in the intervention group was 93.33%, which was significantly higher than that in the control group ($P < .001$).

### 3.7. Effective chemical constituents of Xubi capsules as single herb

As shown in Table 6, after screening the effective ingredients of Xubi capsules, there were differences in the corresponding effective fractions for different compound sources. After screening, a total of 176 active ingredients were obtained. Among them, the effective fraction only derived from white

peony is 9, the effective fraction only derived from angelica sinensis is 6, and the sheep bone has the highest effective fraction, with 21 effective fractions. In addition, after extracting the target points of action of Xubi capsule, after weight reduction processing, a total of 446 target information of the drug can be obtained.

### 3.8. Intersection target of Xubi capsule and osteoarthritis

As shown in Figure 2, after extracting, screening, organizing, and deduplicating the targets of OA, a total of 1505 disease targets with human species were obtained. They were then combined with 446 drug target information to obtain the corresponding Venny map. The figure reveals that 209 intersection targets and 209 potential genes for the treatment of OA with active ingredients of Xubi capsules have been identified. And relevant networks were constructed. After topology analysis and calculation, it was found that quercetin, palmitoleic acid, kaempferol, and luteolin are most closely related to diseases, and they are important components for the treatment of Xubi capsules.
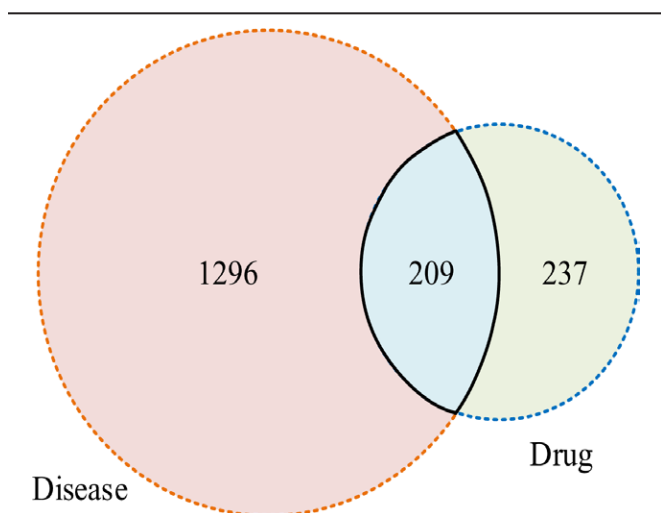


**Figure 2.** Intersection target of Xubi capsule and osteoarthritis.

### 3.9. Parametric statistics of protein–protein interaction Network

As shown in Table 7, after constructing the PPI network, statistical analysis of its parameters revealed that there were 208 nodes, 4284 edges, and an average compactness of 0.003. There was one free node that had been hidden. In view of the number of nodes with an average betweenness center value greater than 200.519 and a mean degree value greater than 41.192, 44 core targets can be selected.

### 3.10. Top 20 core targets

Figure 3 shows the top 20 core targets. The larger the degree value of the core target, the lower its position. Through topology analysis, these targets possess an essential influence on the PPI network, and they have a certain probability of being the key targets for drug treatment of OA.

### 3.11. Gene ontology functional enrichment analysis

Figure 4 shows the analysis of GO functional enrichment. With $P < .1$ as the screening condition, in GO functional analysis, 2097 biological processes (BP), 119 cellular components (CC), and 248 molecular functions (MF) were enriched. After screening, 20 highly enriched BP, CC, and MF were obtained. For BP,

**Table 7**

**Parametric statistics of PPI Network.**

| Project | PPI network |
| --- | --- |
| Number of nodes | 208 |
| Number of edges | 4284 |
| Average clustering coefficient | 0.629 |
| Average eccentricity | 3.221 |
| Average tightness | 0.003 |
| Mean median center value | 200.519 |
| Average degree of freedom value | 41.192 |
| Number of free nodes | 1 |
| Number of nodes with an average betweenness center value greater than 200.519 | 54 |
| Number of nodes with an average degree value greater than 41.192 | 84 |
| Number of core targets | 44 |

PPI = protein–protein interaction.
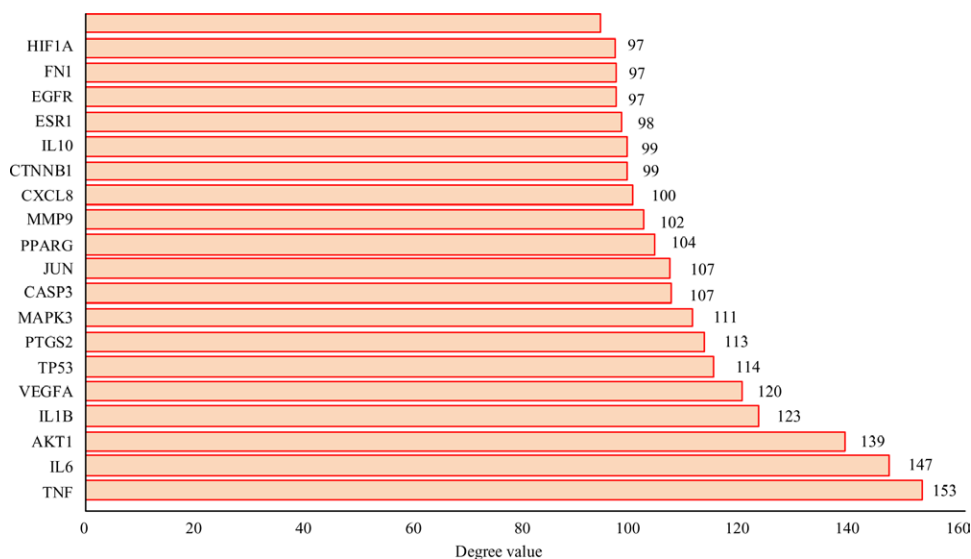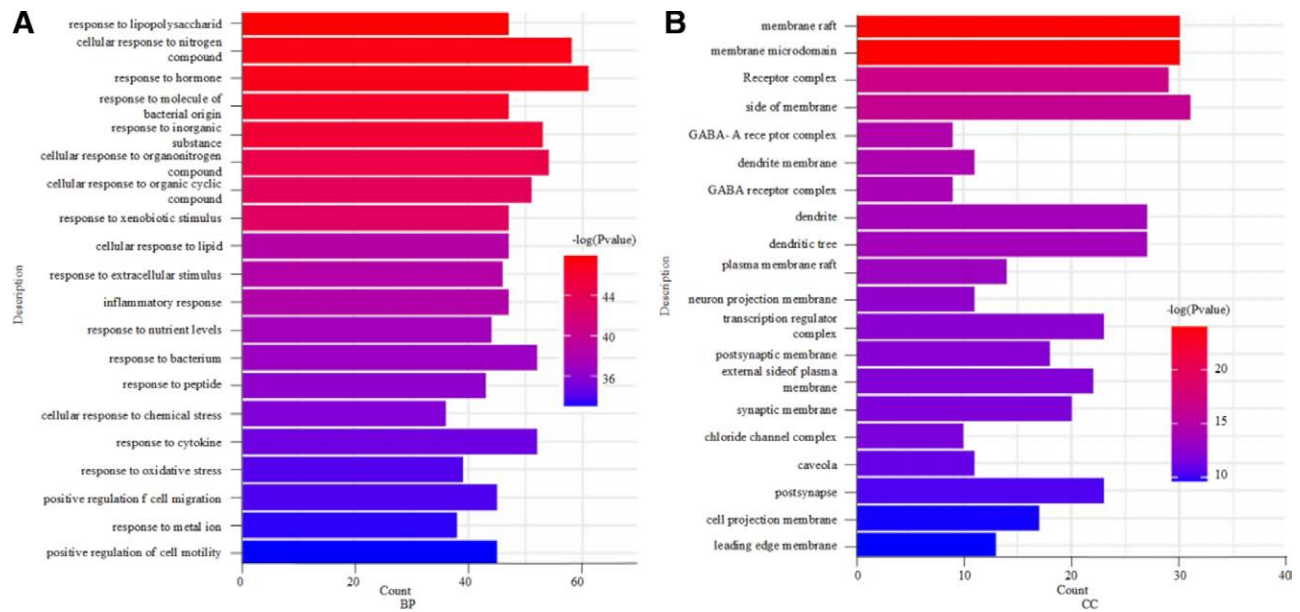


**Figure 3.** Top 20 core targets.

**Figure 4.** Gene ontology functional enrichment analysis.

it is enriched in various aspects such as hormone response and inflammatory response; for MF, it is enriched in aspects such as lipid binding and nuclear receptor activity.

## 4. Discussion

OA belongs to a degenerative bone and joint disease, with the main symptom being joint inflammation. This disease has a significant impact on patients' psychology, physiology, daily life, family, and society.[19–21] The pathogenesis of OA is not yet clear, and it is often believed to be caused by various factors such as age, obesity, genetics, environment, physiology, psychology, hormones, bone density, excessive activity, trauma, and abnormal joint morphology. Currently, there is no effective treatment method. Currently, there are various therapeutic drugs available in Western medicine, such as nonsteroidal anti-inflammatory drugs, biologics, and so on. However, some Western medicines have certain side effects, such as gastrointestinal irritation, and liver and kidney damage, which can have adverse effects on the patient's body and may have unexpected therapeutic effects on some patients. The combination of traditional Chinese and Western medicine has become a hot topic of concern for scholars both domestically and internationally. Its therapeutic effect is precise, which helps to reduce the side effects of Western medicine and strengthens the control of the condition. OA belongs to the category of "Bi syndrome" in traditional Chinese medicine, with a long course of disease and certain damage to bones. Prolonged illness can easily lead to "deficiency," so liver and kidney deficiency syndrome is common in clinical practice. Xubi capsule is composed of 17 kinds of medicinal materials, such as Cinnamomum cassiae, Saposhnikovia divaricata, and Paeonia lactiflora. The traditional Chinese patent medicines and simple preparations have certain applications in the treatment of OA and have good curative effects.[22–24] Scholars have applied Dachaihu Tang to the treatment of nonalcoholic fatty liver disease. The research results have found that total glycosides of peony have analgesic effects and have a reducing effect on serum inflammatory factor levels. Overall, the treatment effect is better.[25] Total flavonoids of Rhizoma Drynariae (TFRD) are an important part of Rhizoma Drynariae. Some scholars applied TFRD in the related experiments of avascular necrosis of the femoral head, taking rats as research objects. From the experimental results, it can be found that TFRD has a protective effect on osteoblasts, preventing them from damage, promoting osteoblast proliferation, and inhibiting their apoptosis.[26] Some scholars have studied amyloid precursor protein/presenilin 1 mice and instructed them to take safflower leaf powder (SLP) to understand their cognitive function changes and analyze the role of SLP in neuroprotection. Through analysis, it was found that SLP has anti-inflammatory and antioxidant properties, plays an active role in the intervention of cognitive impairment in mice, and helps to prevent Alzheimer's disease.[27] Therefore, the study adopts a combination of traditional Chinese and Western medicine to apply Xubi Capsule in the treatment of OA with liver and kidney deficiency and explores its pharmacological mechanism.

Overall, compared with the control group, the intervention group patients showed more significant improvement in OA. After treatment, the intervention group patients had lighter joint swelling and tenderness, better muscle strength, lower ESR levels, more significant improvement in VAS score and DAS28-ESR levels, shorter morning stiffness time, lower Th17 ratio, lower Th17/Treg value, higher Treg cell ratio, and more significant improvement in CRP indicators. The total effective rate of the latter was 93.33% in the intervention group, while the total effective rate of the control group was 73.33%. When collecting the ingredients of the traditional Chinese medicine of Xubi capsules, there were 176 active ingredients in total, and many medicines had many common ingredients. Among the ingredients used to treat OA, the top 2 are quercetin and palmitoleic acid. In the PPI network, tumor necrosis factor, interleukin-6, protein kinase B 1, interleukin-1B, and Vascular endothelial growth factor A have the highest correlation with disease, which may be the core target of OA treatment.

According to the relevant results, it can be found that the research method is better than Western medicine therapy, which can improve the symptoms of OA more obviously, inhibit inflammatory factors, and inhibit the activity of OA. Through the analysis of relevant pharmacological mechanisms, it is indicated that the Xubi capsule exerts therapeutic effects through targeting. Some scholars extract the rhizomes of Anemarrhena asphodeloides and analyze the extracted compounds. The results showed that this compound can inhibit its activity when acting on relevant cancer cell lines.[28] Some scholars extract saponin thorns and analyze the properties of the extracted flavonoids. The results indicate that the extract can effectively inhibit the growth of cancer cells and has good antioxidant properties.[29] Some scholars take rats as the research object and analyze the

relationship between deshuangcatalpol and calcium-binding protein in synovium when they study knee OA. Through comparative experiments, it was found that the extract has a certain possibility of inhibiting the validation reaction, which is conducive to alleviating knee OA.[30]

In summary, Xubi capsule combined with Western medicine therapy can alleviate symptoms such as joint swelling in patients, inhibit inflammatory factors, and have a high overall effective rate. Quercetin and palmitoleic acid are important compounds that regulate OA.

## Author contributions

**Methodology:** Zhi-Hui Guo, Hui-Ying Ni, Meng-Ya Tang.
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**Writing—original draft:** Zhi-Hui Guo.
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**Formal analysis:** Hui-Ying Ni.
**Funding acquisition:** Hui-Ying Ni.
**Investigation:** Hui-Ying Ni, Meng-Ya Tang.

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