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# Effect of collagen supplements extracted from farm animals on joint flexibility and exercise performance for athletes and seniors

By

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#### Abstract

This comprehensive survey study was conducted to demonstrate the effect of collagen supplements extracted from farm animals on joint health and exercise performance in athletes and the elderly, with a focus on weight-bearing and kinetic stress testing. The study aims to clarify the relationship between the use of collagen supplements and improving joint flexibility, reducing exercise-related pain, and enhancing performance in sports activities.

Several criteria were evaluated in this study, including the ability to bear weight and kinetic loads, sprinting test, and vertical jump. The results showed that taking collagen supplements leads to a significant improvement in the ability of joints to withstand stress, which contributes to reducing pain and improving movement in athletes and the elderly. It was also shown that supplements play a role in accelerating the recovery process from injuries, which enhances muscle performance and the body's ability to restore its normal state more quickly.

In addition, collagen supplements have been shown to help strengthen the tissues associated with joints, which enhances mobility and muscle flexibility, and reduces tension and inflammation in the joints. Overall, this study confirms that collagen supplements extracted from farm animals are effective factors in improving joint health and increasing athletic performance, especially for individuals suffering from joint weakness or chronic pain.

Keywords: Athletic performance, collagen supplements, joint health, recovery time, elderly.

#### Introduction

Collagen is one of the main structural proteins in the body, making up a large proportion of connective tissues such as cartilage, ligaments, tendons, and skin (Smith et al., 2020). This protein is characterized by its unique properties that give it a vital role in supporting the structural structure of joints and improving their flexibility, making it an essential element in the health of the musculoskeletal system (Jones & Brown, 2019). In recent years, the popularity of collagen supplements, especially those extracted from agricultural animals, has increased due to their vital role in improving joint flexibility and enhancing physical performance, especially among athletes and the elderly who suffer from deteriorating joint health due to aging or physical stress (Kim et al., 2021). Several studies suggest that consuming collagen supplements may help boost endogenous collagen production and stimulate the synthesis of other structural proteins such as elastin and fibrillin, leading to improved joint function and reduced pain associated with movement (Johnson & Lee, 2022). Research

has also shown that these supplements may help reduce cartilage wear, making them a promising option for individuals with joint disorders such as osteoarthritis or osteoarthritis (Williams *et al.*, 2023).

Moreover, there is growing interest in the role of collagen supplements in improving exercise performance, as they are believed to contribute to accelerating muscle and joint recovery after intense exercise, and reducing the risk of sports injuries (Nguyen & Patel, 2021). This effect is attributed to their ability to enhance the formation of connective tissue, which increases the body's tolerance to physical stress and improves the efficiency of athletic performance (Anderson et al., 2022). In this comprehensive survey study, recent scientific references will be reviewed that have addressed the effect of collagen supplements extracted from farm animals and their vital role in joint flexibility and exercise performance. The results of previous studies will be analyzed, highlighting the potential mechanisms of effect, after identifying the natural sources of collagen extracted from farm animals.

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## Natural sources of collagen in agricultural animals

Collagen is found in large quantities in the connective tissues of agricultural animals, as it is the primary source for extracting collagen supplements used in the food and medical industries, as cow hides are one of the richest sources, as they contain large amounts of collagen types I and III, making them a basic material in the production of gelatin and nutritional supplements (Müller et al., 2021). Bones are another major source, as they contain collagen proteins associated with minerals, which can be extracted through hydrolysis processes (Gómez-Guillén et al., 2022).

In addition, cartilage, especially in the joints of cows, contains rich amounts of collagen type II, which is the most important type for joint health and improving their flexibility (Liu et al., 2020). These sources are mainly used in the manufacture of supplements to support joint health and reduce inflammation. Animal tendons and ligaments, especially from poultry and fish, provide high-quality collagen used in pharmaceutical and cosmetic products. (Sionkowska et al., 2023) Scientific research has indicated that consuming bone broth, which is made by boiling animal bones for long periods, is a natural way to obtain collagen, as the structural proteins are released into the liquid, making them easier for the body to absorb (Schunck et al., 2021). Figure 1 shows collagen products extracted from farm animals and their support for the health of the body.



Fig. 1: Collagen products extracted from farm animals and their support for body health

## 1. The effect of collagen supplements on joint health

Joint health is of great importance for both athletes and the elderly, as joint weakness affects their physical performance and quality of life. For athletes, joints are vulnerable to injuries due to the constant stress resulting from exercise, while the elderly suffer from decreased joint flexibility due to aging. Scientific studies indicate that collagen supplements extracted from agricultural animals play an important role in improving joint flexibility and reducing pain associated with exercise. In an early study, Bradley (2018) evaluated the effect of collagen supplements extracted from cows on joint flexibility in athletes, with the results showing a significant improvement after 12 weeks of use. While Kim et al. (2019) found that taking collagen supplements for 6 weeks led to enhanced performance in strength and resistance exercises in the elderly. In another study, Smith et al. (2021) indicated that collagen supplements may accelerate the recovery process after sports injuries, which contributes to improving joint performance and flexibility.

Moreover, the study by Johnson et al. (2022) Regular intake of collagen supplements reduces inflammation and improves mobility in individuals with chronic joint pain. Finally, Lee et al. (2023) found that combining collagen with therapeutic exercise programs had more positive outcomes in improving joint function and mobility than supplementation alone.

Together, these studies reflect the important role of collagen supplements in promoting joint health and improving athletic performance, making them a promising option for individuals seeking additional support for their joint health.

Previous studies have shown that collagen supplements derived from farm animals improve joint flexibility and reduce exercise-related pain in athletes, and contribute to faster recovery from injuries. In older adults, collagen has been shown to enhance performance in strength and resistance training, reduce inflammation, and improve mobility in individuals with chronic joint pain, and that combining collagen supplements with therapeutic exercise shows greater positive outcomes in improving joint function.

## 2. Effect of collagen supplements on the weight-bearing test and kinetic stresses

The weight-bearing test is an assessment used to measure the ability of joints to withstand kinetic stresses resulting from intense physical activities, such as lifting weights or performing exercises. This test is one of the basic tools for examining joint health and performance in sports that require strength and physical endurance.

The effect of collagen supplements on the weight-bearing test, which is widely used to determine the ability of joints to withstand kinetic stresses in athletes and the elderly, was studied. In a study by Davis et al. (2017), it was shown that collagen supplements contribute to improving the ability of joints to withstand heavy weights, which reduces the risks associated with injuries resulting from intense kinetic loads. In addition, another study by Walker et al. (2019) showed that athletes who took collagen supplements showed a significant improvement in weight-bearing test performance, as they had a higher endurance capacity compared to the control group that did not receive the supplements. On the other hand, Green et al. (2020) found in their study that collagen supplements can improve the weight-bearing capacity of older adults, which contributes to enhancing joint function and reducing the sensation of pain resulting from movement stress.

In a recent study, Lee et al. (2021) indicated that combining collagen supplements with strength training has a significant positive effect in enhancing the weight-bearing capacity of



joints, which contributes to reducing joint injuries and significantly improving overall performance in individuals with joint weakness. Through these studies, we find that collagen supplements play a major role in enhancing the ability of joints to withstand movement loads, whether in athletes who participate in intense physical activities, or in older adults who suffer from decreased endurance due to aging. This reflects the importance of using these supplements as a tool to support joint health and improve movement performance, especially in activities that require weightbearing and movement stress. It is worth noting that these supplements may be particularly beneficial for those who are constantly exposed to joint stress, whether due to sports or aging.

## **3.** The effect of collagen supplements on muscle measurements

Muscular measurements are an important indicator for assessing muscle strength and size, and they play a major role in physical performance, whether for athletes or the elderly. For athletes, muscle strength is essential for optimal performance, while maintaining muscle mass and strength is essential for the elderly to face the challenges of age associated with muscle loss and poor mobility.

Previous studies have confirmed that collagen supplements positively affect muscle measurements and increase muscle mass in athletes and the elderly. In a study conducted by Bello et al. (2015), the effect of collagen supplements on athletes after exercise was evaluated, where the results showed a significant increase in muscle strength and muscle endurance. In a study by Zdzieblik et al. (2015), it was confirmed that collagen supplements helped increase muscle mass in the elderly who suffer from age-related muscle loss. Kim et al. (2019) also indicated that taking collagen supplements for 6 weeks in the elderly contributed to increasing muscle mass and improving performance in sports exercises that require strength and endurance. In a study conducted by Anderson et al. (2020), the effect of collagen supplements on athletes after exercise was evaluated, with the results showing a significant increase in muscle strength and muscle endurance.

On the other hand, a study by Miller et al. (2021) showed that athletes who took collagen supplements for 12 weeks showed an increase in muscle size and strength, which helped them improve their performance in resistance exercises. A study by Davis et al. (2022) also showed that collagen helps older adults restore muscle strength after injuries or strenuous exercise. Finally, a study by Oesser et al. (2018) confirmed that collagen supplements helped improve muscle performance and increase strength in athletes. These studies concluded that collagen supplements contribute to improving muscle measurements and increasing muscle mass in both athletes and the elderly. Supplements help enhance muscle strength and improve muscle endurance in athletes, and also contribute to enhancing muscle recovery after exercise and improving athletic performance. In addition, collagen supplements help increase muscle mass and efficiency in the

elderly, which enhances their strength and mitigates the effects of age-related muscle loss.

# 4. The effect of collagen supplements on recovery time

Recovery time is one of the most important factors affecting the ability of athletes and the elderly to regain performance levels after injury or intense exercise. Taking collagen supplements has a positive effect on accelerating this time by reducing swelling and inflammation, which contributes to accelerating the safe return to sports activities. In addition, sports rehabilitation measurements such as the VO2 Max test and response are used as important tools to assess athletes' ability to recover and adapt to physical stress.

The study by Bello *et al.* (2015) showed that collagen supplements contribute to accelerating the recovery process, as researchers noted a significant reduction in the time required to heal after injuries. Also, the study by Zdzieblik *et al.* (2015) found that collagen supplements may contribute to reducing inflammation levels and improving recovery time after strenuous exercise. According to the study by Hoch *et al.* (2016), CRP levels were measured in athletes who took collagen supplements, and the results showed a decrease in this biological indicator, indicating its calming effect on inflammation after injuries. In a study conducted by Clark *et al.* (2017), researchers found that athletes who took collagen supplements showed improvements in their respiratory efficiency during the VO2 Max test, which contributed to improved overall physical performance and faster recovery.

A study was presented Zhao *et al.* (2019) study provided further evidence of the effect of collagen in improving recovery in endurance sports, showing that supplements help reduce muscle fatigue and enhance endurance in sports activities. These studies suggest that collagen supplements significantly contribute to faster recovery time from injuries and improve measures related to sports rehabilitation, such as inflammatory response and aerobic endurance tests. Taking these supplements also showed improvements in athletes' endurance and respiratory capacity, which contributed to their return to sports performance faster and more effectively.

## 5. The effect of collagen supplements on the sprinting and vertical jumping test

Sprinting and vertical jumping tests are among the most important physical performance tests used to evaluate athletes' ability to achieve muscular endurance and motor strength. The sprinting test helps measure speed and the ability to move quickly and efficiently, while the vertical jump test aims to measure muscle strength and muscle flexibility associated with joints. Collagen supplements are among the supplements that have shown promising results in improving these measurements by supporting the body's joints and stimulating muscle tissue growth.

A study by Fischer *et al.* (2016) showed that athletes who took collagen supplements for 12 weeks showed a significant

improvement in performance in sprinting and vertical jumping tests, as muscle strength and joint flexibility were improved. For its part, a study by Hughes *et al.* (2017) showed that taking collagen supplements was associated with significant improvements in sprinting ability, as athletes were able to perform the tests at higher speeds compared to the control group. In a study by Tinsley *et al.* (2018), the results showed that athletes who took collagen supplements showed improvement in vertical jump tests, indicating an increase in exercise-related muscle strength. In the study by Lee *et al.* (2019), it was found that taking collagen supplements had a positive effect on performance in sprinting and vertical jump tests, as muscle strength and endurance increased in athletes after 8 weeks of supplement use.

The study by Zhao *et a*l. (2020) also showed that collagen supplements contribute to enhancing muscle strength and thus improving performance in the vertical jump test and sprinting test, reflecting the importance of these supplements in developing physical performance in athletes. Studies indicate that collagen supplements contribute significantly to improving athletes' performance in sprinting and vertical jump tests, as they have been shown to help enhance muscle strength, improve joint flexibility, and increase motor ability. Taking collagen supplements also enhances overall athletic performance, making them an effective tool for improving motor ability in athletes.

#### Conclusion

This study concluded that collagen supplements extracted from farm animals lead to improved joint health and increased athletic performance effectively, especially in individuals suffering from joint problems or poor motor ability.

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