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A Literature Review of Undenatured type II collagen (UC-II) in Joint Health and Disease

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ABSTRACT: Undenatured type II collagen (UC-II) is supplementary which is from chicken sternum cartilage. (Lugo, J. P., Saiyed,…,2015) UC-II has undenatured type II collagen componentand. The safety and capability of UC-II in adjusting joint discomfort in Osteoarthritis and Rheumatoid arthritis support by previous preclinical and clinical studies. (Lugo, J. P., Saiyed,…,2013) Osteoarthritis (OA) is atrophy joint disease affecting the quality of life of the elderly population. A lot of evidence that nutraceuticals from natural herbs may play essential part in inflammation and joint catastrophe in OA. Moreover, various studies these supplements have been found to be proficient in OA. None of these supplements have reported side effects. However, questions connected to their capability and safety for OA prevention and treatment is quality trials are needed to give absolute answers. (Vaishya, R., Agarwal,…,2018)

KEYWORDS: undenatured type II collagen (UC-II), supplement, treatment, osteoarthritis (OA), rheumatoid arthritis (RA)

INTRODUCTION

Undenatured type II collagen has become prominent as a dietary supplement element consumed by those who want to improve their joint health. This supplements will relieve stiffness and discomfort while concomitantly or subsequently improving flexibility. According to in 2019 Innova Market Insights,35% of dietary supplement products launched globally featured collagen in various kind, inclusive of joint health, bone health, and nutritional cosmetics. Following to United States marketing information for the natural products industry, cross-channel sales growth of collagen in 2019 was 82.7%, reaching $147 million for the year. (Harris, R. B.,…,2021) Osteoarthritis (OA) and rheumatoid arthritis (RA) is the two most common and best known types. Present pharmacological strategies mainly address immune suppression and antiinflammatory mechanisms and have had restricted success. Latter research provides evidence that alterations in the three-dimensional configuration of glycoproteins are responsible for the recognition signaling that catalyzes T-cell attack. Previous studies have indicated that small doses of orally administered undenatured type II chicken collagen effectively inhibited killer T-cell attack. The presence of active epitopes in the UC-II collagen is confirmed by an enzyme-linked immunosorbent assay test and distinguishes this form from hydrolyzed or denatured collagen. The existence of active epitopes in the UC-II collagen is confirmed by an enzyme-linked immunosorbent assay test and diminishes this form from hydrolyzed or denatured collagen. Oral consume of small amounts of glycosylated UC-II presents active epitopes, with the exact three-dimensional structures, to Peyer's patches, which influences the signaling required for the development of immune patients.UC-II has shown that the capacity to induce patient, effectively reducing joint pain and swelling in RA subjects. Essential pain reduction including morning stiffness, stiffness following periods of rest, pain that declines with use of the affected joint and loss of joint range of act and function was observed. So, UC-II may serve as a novel therapeutic tool in joint inflammatory conditions and symptoms of OA and RA. (Bagchi, D., Misner,…,2002)

CASE REPORTS IN ANIMALS

The first case, Undenatured type II collagen (UC-II) only or in mix with glucosamine HCl and chondroitin sulfate in arthritic dogs. Twenty dogs divided into four groups (n = 5) were daily treated orally for 120 days: group I, placebo; group II, 10 mg UC-II; group III, 2,000 mg glucosamine + 1,600 mg chondroitin; group IV, UC-II (10 mg) + glucosamine (2,000 mg) + chondroitin (1,600 mg), followed by a 30-day withdrawal period. On every monthly, dogs were examined for all pain, pain upon limb manipulation, and exercise-associated lameness. Dogs in group I presented no change in arthritic conditions. Dogs gaining UC-II only showed essential reductions in all pain within 30 days (33%) and pain upon limb manipulation and exercise-associated lameness after 60 days (66% and 44%, respectively) of treatment. Top reductions in pain were noted after 120 days of treatment (all

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pain reduction, 62%; pain reduction upon limb manipulation, 91%; and reduction in exercise-associated lameness, 78%).The all activity of the dogs in the UC-II supplemented with glucosamine and chondroitin group (group IV) was essentially better than the glucosamine + chondroitin-supplemented group (group III). Glucosamine and chondroitin alleviated some pain, but in combination with UC-II (group IV) provided vital reductions in overall pain (57%), pain upon limb manipulation (53%), and exercise-associated lameness (53%). According withdrawal of supplements, overall dogs (groups II to IV) experienced a relapse of pain. None of the dogs in any groups indicated any opposite effects or change in liver or kidney function markers or body weight. Information of this placebo-controlled study show that daily treatment of arthritic dogs with UC-II only or in mix with glucosamine and chondroitin markedly alleviates arthritic-associated pain, and these supplements are well patients as no side effects were noted. (d'Altilio, M., Peal,…,2007)

The second case, Twenty male rats were subjected to partial medial meniscectomy tear (PMMT) surgery to induce OA. Suddenly after the surgery 10 rats get vehicle and another 10 rats oral daily dose of UC-II at 0.66 mg/kg for a period of 8 weeks. Furthermore 10 naïve rats were used as an intact control and another 10 rats gained sham surgery. Study finalpoints included a weight-bearing ability of front and hind legs, serum biomarkers of bone and cartilage metabolism, analyses of subchondral and cancellous bone at the tibial epiphysis and metaphysis, and cartilage pathology at the medial tibial plateau using histological means. PMMT surgery produced middle OA at the medial tibial plateau. Especially, the deterioration of articular cartilage negatively impacted the weight-bearing capability of the operated limb. Prompt treatment with the UC-II preserved the weight-bearing capacity of the injured leg, conserved integrity of the cancellous bone at tibial metaphysics and limited the excessive osteophyte formation and deterioration of articular cartilage. Study conclusion showed that a clinically relevant daily dose of UC-II when applied suddenly after injury can boost the mechanical function of the injured knee and prevent excessive deterioration of articular cartilage.(Bagi, C. M., Berryman,…,2017)

The third case, In horses checked arthritic pain gaining by analysis constantly placebo, undenatured type II collagen (UC-II) at 320, 480, or 640 mg which giving 80, 120, and 160 mg active UC-II, successively, and glucosamine 5.4 g and chondroitin 1.8g, successively, offer for the first month, and after that time once daily for 150 days. All pain in Horses were checked including, ache upon limb disposition, fleshly checking, and liver and kidney functions. On the same surface, assessment of all pain was based in a persistent cognizance of all subjects during a walk and run slowly in the same methods. Additionally, ache upon limb manipulation was conducted after the walk and run slowly. Which consisted of placing the affected joint in serious flexion for a period of 60 sec. The leg and arm was then placed to the surface and the animal trotted off. After that, reaction to the flexion examine was then noted with the first strides the animal took. Clinically, Flexion test was persistent with assigning the degree of osteoarthritis in a joint. Horses gaining placebo demonstrated no change in arthritic condition, while those gaining 320 or 480 or 640 mg UC-II exhibited essential reduction in arthritic pain ($P < 0.05$). UC-II at 480 or 640 mg dose provided equal effects, and therefore, 480 mg dose was considered optimal. With this dose, reduction in overall pain was from 5.7 ± 0.42 (100%) to 0.7 ± 0.42 (12%); and in pain upon limb manipulation from 2.35 ± 0.37 (100%) to 0.52 ± 0.18 (22%). Though glucosamine and chondroitin treated group demonstrate vital ($P < 0.05$) reduction in pain liken with pretreated values, the proficiency was little compared with that observed with UC-II. Actually, UC-II at 480 or 640mg dose was found to be more proficient than glucosamine and chondroitin in arthritic horses. Clinical condition (body weight, body temperature, respiration rate, and pulse rate), and liver (bilirubin, GGT, and ALP) and kidney (BUN and creatinine) functions still no change, suggesting that these supplements were well patient.(Gupta, R. C., Canerdy,…,2009)

CASE REPORTS IN HUMAN

The first case, One hundred ninety-one volunteers were randomized into three groups gaining a daily dose of UC-II 40 mg, G 1500 mg C 1200 mg , or placebo for a 180-day period. The primary final point was the change in total Western Ontario McMaster Universities Osteoarthritis Index (WOMAC) from baseline through day 180 for the UC-II group versus placebo and GC. Secondary final points included the Lequesne Functional Index (LFI), the Visual Analog Scale (VAS) for pain and the WOMAC subscales. Modified intent-to-treat investigation were showed for overall final points using analysis of covariance and combined model repeated measures, while incremental part under the curve was calculated by the intent-to-treat means. The conclusion at day 180, the UC-II group showed a vital reduction in all WOMAC score compared to placebo is $p = 0.002$ and GC is $p = 0.04$. Supplementation with UC-II also resulted in essential changes for all three WOMAC subscales:the first, pain is $p = 0.0003$ versus

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placebo, p = 0.016 versus GC. The second, stiffness is p = 0.004 versus placebo, p = 0.044 versus GC. The third, physical function is p = 0.007 versus placebo. Safety results did not differ among the groups. Summary is UC-II adjusted knee joint symptoms in knee OA subjects and was well-tolerated. Further studies that explain the mechanism for this supplement's actions are garranted.(Lugo, J. P., Saiyed,…,2015)

The second case, The randomized study both double-blind and placebo (PLA)-managed was proceeded in vigorous subjects with ArJD who have never had osteoarthritis. Ninety-six n = 96 patients who approximately age 20–55 years old and informed joint ailment as acting Formula One leg stepping down examination were earned either PLA n = 48 or 40 mg of undenatured collagen n = 48 every day will gain supplements for 24 weeks. Range of motion (ROM), digital goniometer will use flexion and extension were scaled. Finally, the study a statistically essential enhance in knee ROM flexion was found in the undenatured collagen group 3.23° compared the PLA group 0.21° is p = 0.025. Moreover, expand in knee ROM extension by 2.21° was observed over time in the undenatured collagen group is p = 0.0061, while the PLA group demonstrated an unessential expand by 1.27° is p 0.05. Subgroup assay by age indicated a vital escalate in knee ROM flexion in subjects 35 years old in the undenatured collagen supplemented group 6.79° compared with PLA 0.30° is p = 0.0092. In conclusion, these results recommend that daily supplementation of 40 mg of undenatured collagen adjust knee joint ROM flexibility and extensibility in healthy subjects with ArJD.(Schön, C., Knaub,…,2022)

SUMMARY

Osteoarthritis (OA)is the most ordinary joint disease affecting humans and animals. OA is a sore, decadent, and inflammatory disease that affects synovial joints and finally leads to loss of motion. Non-pharmacological preventive, many pharmaceutical therapeutic representatives, and some medicines may decrease the advancement of OA in animals. More clinical and experimental studies have displayed that the undenatured form of type II collagen (UC-II) presents ordinary health sake to sick with OA person.(Gencoglu, H., Orhan,…,2020) UC-II is a special element that supports strong joints. It is believed that the advantage that derive from UC-II usage now spreads to include healthy individuals. Furthermore, refer from toxicological studies this ingredient obviously to be safe for people consumption based on an ample series of in vivo and in vitro. In conclusion, daily supplementation with 40 mg of UC-II supports joint systems and resilience in healthy person as demonstrated better knee extension and has the potential both to relieve the joint pain that provisionally arises from strenuous exercise and to lengthen of pain free. (Lugo, J. P., Saiyed,…,2013)

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