

GelcoPEP bioactive peptides play an important role on joint diseases: a 28-day observational study

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Abstract

The present prospective and single-center clinical study investigated the safety and efficacy of GelcoPEP bioactive peptides. The range of motion, general pain, and muscle strength were evaluated. The results indicated that administration of 10 g/day of hydrolyzed collagen for 28 days improved essential symptoms in individuals suffering from joint diseases, including range of motion, general pain, and muscle strength. These data support the view that hydrolyzed collagen may be administered to patients suffering from joint diseases. No adverse effects were observed during the trial. These data support its use for patients suffering from degenerative joint diseases, including cartilage injuries, connective tissue disorders, polychondritis, joint defects, osteoarthritis, and rheumatoid arthritis.

Key-words: hydrolyzed collagen, joint diseases, range of motion, general pain, muscle strength.

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Introduction

GelcoPEP, a bovine hydrolyzed collagen, is a dietary supplement that may be beneficial for patients suffering from degenerative joint diseases, including cartilage injuries, connective tissue disorders, polychondritis, joint defects, osteoarthritis, and rheumatoid arthritis. Its use in the treatment of degenerative joint diseases has increasingly gained support in medical community and among consumers¹.

Collagen is a major protein in the human connective tissue, while its concentration varies in different body parts: cartilages, cornea, arteries, and skin. Robust and inextensible, possessing a great tensile strength, it is the principal component of cartilages, tendons and articular joints, bones and teeth^{1,2}.

Also, collagen is the building material for the blood vessel walls—capillaries, veins, arteries. It imparts to them strength and energy, structure and flexibility for the effective transport of blood to each single cell. Collagen is of vital importance for muscle functioning. The collagen molecules provide the muscle fibers with power and structure, which are necessary for their functioning all day long. Collagen not only builds up the muscle fibers, but also the smooth muscles—the cardiac muscle, the bladder muscles and the genitalia muscles².

In preclinical studies, it has been demonstrated that orally administered hydrolyzed collagen is thoroughly absorbed by the intestine and circulated in the blood stream, remaining in the gastrointestinal tract. These studies also revealed that that a significant amount of hydrolyzed collagen derived peptides reaches joint tissue. In addition, it was exposed that treatment of cultured chondrocytes induced a statistically significant dose-dependent increase in collagen synthesis of the chondrocytes in cell culture experiments^{3,4}.

Based on the findings that hydrolyzed collagen is absorbed in its high molecular form, accumulating in cartilage, and is able to stimulate chondrocyte metabolism, it might be reasonable to use hydrolyzed collagen as a nutritional supplement to activate collagen biosynthesis in chondrocytes in humans, especially patients suffering from degenerative joint diseases. Thus, the aim of this prospective and single-center investigation is to extend these earlier findings with GelcoPEP.

Materials and methods

Study design

Subjects' complaints of joint discomfort were recorded using pre- and post-treatment questionnaires to evidence personal data and issues related to an individual's functional quality. A goniometer was used to measure the range of motion⁵, a pain scale (Borg) was applied to subjectively percept the pain⁶, and a properly calibrated sphygmomanometer was utilized to evaluate muscle strength⁷.

Urine was collected for a pregnancy test for women of childbearing potential. A blood sample was taken for determination of alanine transaminase (ALT), aspartate transaminase (AST), bilirubin, blood urea nitrogen (BUN) and creatinine. Upon review of blood test results, eligible subjects were instructed to get an X-ray of the affected joints to confirm diagnosis.

A total of 64 subjects were recruited using the inclusion and exclusion criteria outlined in Table 1. At the first visit, selected subjects, properly informed by the Consent Term approved by the Scientific Committee of the Institute, were assigned to receive 10 g GelcoPEP (Gelco International, Pedreira, Brazil) daily. At the final visit, subjects were required to come to the clinical division for clinical assessment. A subject treatment diary was completed by each patient throughout the study period to determine product compliance, side effects, and supplementation use.

Statistical method

For comparing non-parametric values, the Wilcoxon's test was used, and for comparing parametric values, the variance analysis (ANOVA) test were used. A significance level of 5% was adopted in all comparisons and statistically significant results were marked with an asterisk (*).

Table 1. Inclusion and exclusion criteria

Inclusion criteria
Males and females 45-60 years old
Females of childbearing potential must agree to use a medically approved form of birth control and have a negative urine pregnant test result
Disorder of the knee for more than three months
Able to walk
Availability for duration of study
Subject agrees not to start any new therapies during the course of the study
Able to give informed consent
Exclusion criteria
History of asthma, history of diabetes
Hyperuricemia
Hypersensitivity to NSAIDs
Abnormal liver or kidney function tests
Abnormal findings on complete blood count
Uncontrolled hypertension
History of allergic reaction to any ingredients in the test product
Hyperkalemia (potassium > 6.2 mmol/L)
History of cancer as well as gastrointestinal, renal, hepatic, cardiovascular, hematological, or neurological disorders
Anticipated problems with product consumption
High alcohol intake (>2 standard drinks per day)
History of psychiatric disorder that may impair the ability of subjects to provide written informed consent
Use of concomitant prohibited medication (narcotics, NSAIDs)
Any other condition that, in the opinion of the investigator, would adversely affect the subject's ability to complete the study or its measures

Results

Baseline characteristics of patients are summarized in Table 2. Where applicable, values are expressed as mean \pm standard deviation.

Table 2. Baseline characteristics of patients.

Characteristics of patients	Values
Age (years)	59.7 \pm 8.72
Sex (male/female)	28/36
Height (cm)	168.3 \pm 9.74
Weight (kg)	72.9 \pm 16.3
Systolic blood pressure (mm)	121.8 \pm 8.92
Diastolic blood pressure (mm)	80.6 \pm 7.71
Heart rate (bpm)	69.4 \pm 7.56

The results are presented in Table 3 and Table 4 listing values for average, and standard deviation for each analyzed variable. Statistically significant results are marked with an asterisk (*)

Table 3. Range of motion, pain and muscle strength.

Treatment	Range of motion⁵		General pain⁶		Muscle strength⁷	
	Pre	Post	Pre	Post	Pre	Post
Average	103,37	163,73	8,69	2,54	55,39	101,03
Standard deviation	12,65	10,54	10,41	13,12	10,19	11,92
Standard error	3,93	4,17	4,82	5,14	4,58	5,13

Table 4. Pre- and post- treatment groups

Comparison	P
Range of motion	0,021*
General pain	0,007*
Muscle strength	0,005*

These results indicate that administration of 10 g/day of hydrolyzed collagen for 28 days improved essential symptoms in individuals suffering from joint diseases, including range of motion, general pain, and muscle strength. No adverse effects occurred during the 28-day trial period. The treatment was reported to be well tolerated by subjects.

Discussion

In the last few years, various nutritional supplements, including chondroitin, glucosamine, soybean unsaponifiables and diacerein have emerged as new treatment options for joint disorders⁸. The aim of this prospective and single-center investigation is to evaluate the safety and the efficacy of GelcoPEP, which is a complex structural protein that may provide strength and flexibility to connective tissues.

An observational study investigated the use of hydrolyzed collagen as a nutritional supplement to reduce symptoms of joint damage, with the hope that this change would reflect improvements in joint health. In that study, individuals were recruited who had not been diagnosed with degenerative joint disease but who complained about joint pain that both the treating physician and the subjects interpreted as being a result of stressful exercising. It was reported that 78% of

individuals at the end of the study noticed substantial improvement of their joint symptoms, including range of motion, pain, and muscle strength⁹.

The evaluation of muscle strength is an important technique to diagnose the etiology of the disease, and to define rehabilitation strategies. The muscle weakness, which was observed in our study during the pre-treatment assessments, is directly associated with knee joint pain and joint disability¹⁰.

Osteoarthritis results in changes that affect not only intracapsular tissue, as well as periarticular tissues, such as ligaments, capsules, tendons and muscles. Osteoarthritis patients compared to healthy individuals of the same age had muscle weakness, reduced knee proprioception, reduced balance and position sense¹¹.

The presence of joint effusion, even in small amounts, is a potent inhibitory mechanism reflex muscular activity of the joints. A reduced reflex muscular activity causes hypotrophy and weakness early, with the resultant associated mechanical damages, such as decreased range of motion¹².

Muscle strength declines rapidly during the detention of a member by decreasing the size of the muscle and stress per unit of the muscle cross-sectional area. The largest absolute loss of muscle mass occurs at the beginning of hypotrophy process. The pain inhibits reflex muscular activity, causing atrophy, and muscle weakness. The painful process is prior to the muscular weakness¹³.

This single-center investigation suggests that GelcoPEP bioactive peptides may be beneficial for patients suffering from degenerative joint diseases, including cartilage injuries, connective tissue disorders, polychondritis, joint defects, osteoarthritis, and rheumatoid arthritis.

Conclusion

The purpose of this study was to determine whether administration of 10 g of avian sternal collagen type I hydrolysate daily would reduce joint pain in patients suffering from joint diseases. The design of the clinical trial was appropriate to reveal that collagen type I hydrolysate as a nutritional supplement ingested over 28 days was safe and efficacious in reducing symptoms of joint

discomfort. The results of the trial provide data supporting the view that hydrolyzed collagen may be administered to patients suffering from joint diseases. Further research will elucidate additional benefits from hydrolyzed collagen.

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