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EFFECTIVENESS OF ORAL COLLAGEN SUPPLEMENTATION IN IMPROVING SKIN ELASTICITY AND HYDRATION: A LITERATURE REVIEW

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ABSTRACT

Background: Oral collagen supplementation has gained popularity as a strategy for supporting skin health, particularly in the context of aging and disturbances of the extracellular matrix. Evidence suggests that hydrolyzed collagen peptides may affect skin hydration and elasticity by stimulating fibroblast activity and collagen synthesis.
Aim: The aim of this review was to assess the effectiveness of oral collagen supplementation in improving skin elasticity and hydration based on current scientific literature.
Material and methods: A literature review was conducted using the PubMed, Cochrane Library, and Google Scholar databases. Randomized controlled trials, meta-analyses, and systematic reviews published since 2018 that evaluated the effects of oral collagen supplementation on skin hydration and/or elasticity were included.
Results: Most studies indicate that hydrolyzed collagen supplementation is associated with a moderate, statistically significant improvement in skin hydration and elasticity. More pronounced effects were reported for low-molecular-weight collagen peptides and supplementation lasting at least 8–12 weeks. However, analyses limited to studies of the highest methodological quality showed reduced effect sizes.
Conclusion: Available evidence suggests that oral collagen peptides may support improvements in skin hydration and elasticity, although the magnitude of this effect remains uncertain. The most consistent benefits have been observed with low-molecular-weight preparations used for a minimum of 8–12 weeks. Further well-designed studies are required to determine optimal supplementation regimens.

KEYWORDS

Oral Collagen Supplementation, Collagen Peptides, Skin Elasticity, Skin Hydration, Skin Aging

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1. Introduction

Skin aging is a multifactorial process involving progressive structural and functional changes in the epidermis, dermis, and extracellular matrix. One of the key features of these changes is collagen degradation, which leads to reduced skin elasticity, impaired hydration, and decreased mechanical strength. Collagen constitutes a major component of the skin extracellular matrix and is responsible for its tensile strength and resilience; disturbances in the balance between collagen synthesis and degradation are therefore considered a central mechanism underlying skin aging(Arseni et al., 2018; Liu et al., 2024).

With advancing age and under the influence of extrinsic factors, particularly ultraviolet radiation, increased matrix metalloproteinase activity and enhanced collagen fiber fragmentation occur. These processes result in progressive loss of skin structural integrity and contribute to the development of clinically visible signs of aging, including wrinkles, skin laxity, and decreased elasticity(Shin et al., 2019).

In recent years, oral collagen supplementation has attracted growing interest as a potential strategy for supporting skin condition. The most commonly used forms are collagen hydrolysates containing low-molecular-weight peptides, which are characterized by increased bioavailability and the ability to interact with skin cells, particularly fibroblasts, through modulation of their activity and extracellular matrix–related processes(Inacio et al., 2024).

Despite the widespread use of collagen supplements, clinical evidence regarding their effectiveness in improving skin elasticity and hydration remains inconclusive. Available studies differ considerably in terms of supplement composition, dosage, and duration of intervention, highlighting the need for a critical synthesis of current evidence(Brueckheimer et al., 2025).

The aim of this review is to evaluate the effectiveness of oral collagen supplementation in improving skin elasticity and hydration based on randomized controlled trials, systematic reviews, and meta-analyses published since 2018.

2. Methodology

2.1. Literature Search Strategy

A literature review was conducted using the PubMed, Cochrane Library, and Google Scholar databases. The literature search was performed up to November 2025. The search strategy included the following terms and their combinations using Boolean operators:

("oral collagen" OR "collagen peptides" OR "hydrolyzed collagen") AND ("skin elasticity" OR "skin hydration" OR "skin aging").

2.2. Inclusion and Exclusion Criteria

Studies meeting the following criteria were included in the review: (1) participation of adult individuals who were healthy or without severe dermatological conditions; (2) use of oral collagen supplementation in any form, including collagen hydrolysates or collagen peptides, regardless of dosage; and (3) reporting outcomes related to the effects of supplementation on skin elasticity and/or hydration. Randomized controlled trials, clinical studies, systematic reviews, and meta-analyses published since 2018 were included.

Studies conducted in animals, investigations evaluating the effects of topically applied collagen, narrative reviews, and case reports were excluded. Publications available in languages other than English were also excluded.

2.3. Study selection and data extraction

Study selection was performed in two stages. In the first stage, titles and abstracts were screened, followed by full-text assessment of studies meeting the inclusion criteria. From each eligible study, data were extracted on study design, sample size, participant characteristics, duration of the intervention, form and dosage of collagen supplementation, assessed skin parameters, and main outcomes. Data extraction was performed manually to ensure accuracy.

3. Results

The results of studies evaluating the effectiveness of oral collagen supplementation in improving skin quality parameters are presented below. As most of the analyzed studies assessed both skin hydration and elasticity simultaneously, the results are presented collectively, with emphasis on statistically significant effects.

Myung and Park, in a systematic review and meta-analysis including 23 randomized controlled trials, evaluated the effects of collagen supplementation on signs of skin aging, particularly skin hydration and elasticity. A total of 1,474 participants were included, predominantly women aged 30–65 years. The included studies differed with respect to collagen source (fish, bovine, or chicken collagen), supplement dosage (ranging from 0.5 g to 10 g/day, with a mean dose of 3.1 g/day), and duration of supplementation (8–16 weeks, with a mean follow-up of 12 weeks). Overall analysis demonstrated a significant increase in skin hydration (SMD = 0.75) and improvement in skin elasticity (SMD = 1.02); however, the effect size was reduced after exclusion of studies with extreme results. The authors noted that these benefits were no longer evident in analyses limited to high-quality studies or studies not funded by industry, in which no significant differences compared with placebo were observed. Consequently, the meta-analysis suggested that although some studies indicate improvements in skin hydration and elasticity, there is currently a lack of unequivocal, high-quality evidence confirming the effectiveness of collagen supplementation in these outcomes(Myung & Park, 2025).

In the same year, Danessa et al. conducted a systematic review and meta-analysis of 10 randomized controlled trials involving 646 participants, demonstrating that oral supplementation with various forms of collagen (low-molecular-weight peptides, collagen tripeptides, and type II collagen) significantly improved skin hydration and elasticity. Analysis of skin hydration revealed a marked increase (SMD = 1.25) with moderate heterogeneity among included studies. Regarding skin elasticity, a meta-analysis of three studies showed a moderate but statistically significant improvement (SMD = 0.61), indicating a beneficial effect of supplementation. The authors emphasized that the effects were more pronounced in women and in supplements containing peptides of lower molecular weight(Danessa et al., 2025).

Similarly, the meta-analysis by Pu et al., which included 23 randomized controlled trials, evaluated the effects of oral supplementation with hydrolyzed collagen on skin aging parameters. A total of 1,721 adult participants aged 30–65 years were included. The studies differed in collagen sources (fish, porcine, bovine,

and chicken collagen), supplement doses (372 mg to 12 g/day), and duration of intervention (2–12 weeks). The analysis demonstrated a significant increase in skin hydration (SMD = 0.63; $p < 0.00001$) and improvement in skin elasticity (SMD = 0.72; $p < 0.00001$) compared with placebo. The authors reported that the hydrating effect occurred regardless of collagen source, although the weakest effects were observed with poultry-derived preparations. In addition, more pronounced effects were noted with supplementation lasting longer than 8 weeks. Interventions lasting ≥8 weeks resulted in greater improvements in skin elasticity, whereas 6-week interventions did not produce significant effects(Pu et al., 2023).

Dewi et al., in a systematic review and meta-analysis, assessed the effects of oral supplementation with hydrolyzed collagen on skin rejuvenation, with particular focus on hydration, elasticity, transepidermal water loss (TEWL), wrinkles, and overall skin condition. Fourteen randomized controlled trials involving a total of 967 participants were included. Study durations ranged from 4 to 12 weeks, and collagen doses varied from 0.3 g to 10 g/day. The meta-analysis demonstrated a significant increase in skin hydration (SMD = 0.58) and elasticity (SMD = 0.54), which was also confirmed in subgroup analyses according to collagen source and duration of supplementation. In addition, a reduction in TEWL (SMD = −0.76) and a small but statistically significant effect on wrinkles (SMD = −0.21; $p = 0.04$) were observed. The effects were most pronounced in interventions lasting ≥8–12 weeks(Dewi et al., 2023).

The meta-analysis by De Miranda et al., which included 19 randomized controlled trials involving 1,125 participants, confirmed the beneficial effects of hydrolyzed collagen supplementation on skin quality parameters. Although the included studies differed in dosage, collagen type, and intervention duration, pooled analysis demonstrated significant increases in skin hydration (SMD = 1.01) and elasticity (SMD = 1.27) compared with placebo. In some studies, the effects persisted after the end of supplementation, suggesting potential durability of the observed benefits. Despite the generally good methodological quality of most randomized controlled trials, interpretation of the results is limited by heterogeneity of protocols, differences in supplement composition, and incomplete reporting of data, indicating the need for further methodologically homogeneous studies(de Miranda et al., 2021).

In a systematic review by Barati et al., which included 10 randomized controlled trials, beneficial effects of collagen supplementation on skin hydration and elasticity were reported. Most of the analyzed studies demonstrated a significant increase in skin hydration following supplementation, and some studies also reported improvement in skin barrier function, including a reduction in TEWL. Improvements in skin elasticity were observed in nearly all included trials, which involved fish, porcine, and bovine collagen at doses ranging from 1 to 10 g/day and intervention durations of 8–12 weeks. These effects were observed regardless of participant age and collagen source. The authors emphasized the consistency of findings across studies, suggesting that collagen supplementation is associated with improvements in key skin quality parameters, including hydration and elasticity(Barati et al., 2020).

Zague et al. conducted a monocenter, randomized, double-blind, placebo-controlled trial to evaluate the clinical efficacy of oral collagen oligopeptides (Col-OP). Eighty-five women aged 45–60 years were enrolled (Col-OP group: n = 42; placebo group: n = 43) and received bovine type I collagen hydrolysate at a dose of 2.5 g/day for 84 days. Supplementation with Col-OP did not affect skin hydration, which increased similarly in both the supplementation and placebo groups; however, a significant improvement in skin elasticity was observed. The R7 parameter increased consistently at all time points, reaching an 8.3% increase after 84 days compared with placebo(Zague et al., 2025).

Lee et al. conducted a randomized, double-blind, placebo-controlled trial evaluating the effects of low-molecular-weight collagen peptides (LMWCPs) on skin aging parameters. Seventy participants aged 20–59 years received oral LMWCPs at a dose of 1,650 mg/day for 8 weeks. A marked improvement in skin elasticity was observed in the collagen group. R2, R5, and R7 values increased progressively from day 10 of supplementation, reaching significant differences compared with placebo at both week 4 and week 8, with persistence of effects after discontinuation of supplementation. In addition, a significant increase in skin hydration was observed, affecting both superficial and deep hydration. Improvements were evident at all measurement points and exceeded changes observed in the placebo group. The study also demonstrated beneficial effects on skin density and a reduction in the number and volume of pores in the periocular area. The effects persisted after a two-week washout period, suggesting relative durability(Lee et al., 2025).

In a randomized, double-blind, placebo-controlled trial, Seong et al. also evaluated the effectiveness of oral supplementation with low-molecular-weight collagen peptides. Eighty-seven participants aged 35–60 years received fish-derived low-molecular-weight collagen peptides at a dose of 2 g/day for 12 weeks. A marked improvement in skin hydration was observed across all assessed sites, significantly exceeding changes

noted in the placebo group ($p < 0.0001$). In addition, an increase in skin elasticity was reported. R2, R5, and R7 parameters improved during supplementation, with the full effect evident after 12 weeks. In the placebo group, elasticity parameters remained unchanged or deteriorated(Seong et al., 2024).

In a randomized, double-blind trial, Vleminckx et al. evaluated the effects of collagen peptide supplementation on signs of skin aging in an Asian population. Eighty-five women aged 43–65 years received porcine-derived collagen at a dose of 5 g/day. After 84 days of intervention, a significant increase in dermal density was observed, with dermal echogenicity increasing by 6.3% compared with placebo. Skin elasticity improved more rapidly in the collagen group, with values 18.9% higher than placebo after 28 days and sustained superiority after 84 days. Skin hydration increased similarly in both groups at day 28; however, after 84 days, the increase was 8.4% greater in the collagen group ($p = 0.023$), indicating a gradual hydration effect. Supplementation also accelerated the reduction of crow's feet wrinkles, with a significant decrease in wrinkle depth observed after 28 days, whereas in the placebo group the effect appeared only after 84 days(Vleminckx et al., 2024).

Morakul et al. conducted a randomized, double-blind, placebo-controlled trial evaluating the effects of oral supplementation with tuna-derived collagen peptides on skin hydration, elasticity, skin density, and TEWL. Seventy-two healthy, non-smoking women aged 40–60 years without skin diseases participated in the study and received tuna collagen hydrolysate at a dose of 5 g/day for 8 weeks. Supplementation led to clinically significant improvements in skin hydration, elasticity, and density, as well as a reduction in TEWL, with effects clearly greater than those observed in the placebo group. Importantly, these benefits persisted for at least 2 weeks after discontinuation of supplementation, indicating sustained effects(Morakul et al., 2024).

Reilly et al. evaluated the effectiveness of a supplement containing hydrolyzed collagen and vitamin C on skin, scalp, and hair parameters. The 12-week study included 130 participants aged 40–60 years, the majority of whom were women (90%). Two dosing regimens were applied: daily supplementation and supplementation every 48 hours, with the same dose of 8,000 mg/day used in both regimens. Significant improvements in skin parameters were observed in participants receiving daily supplementation, whereas supplementation every 48 hours resulted in noticeably weaker effects. Daily supplementation led to greater increases in skin hydration and elasticity compared with placebo. Furthermore, daily dosing significantly increased collagen fiber density and integrity and more effectively reduced collagen fragmentation compared with both placebo and the alternate-day regimen. Although improvements were also observed in the every-48-hours group, they were less pronounced and did not reach statistical significance for some parameters(Reilly et al., 2024).

In the study by Evans et al., the effects of oral supplementation with hydrolyzed freshwater fish collagen on skin aging parameters were assessed, including wrinkle visibility, cheek skin elasticity, and subjective evaluation of skin quality. Fifty women aged 45–60 years were assigned to receive collagen supplementation for 12 weeks ($n = 25$) or placebo ($n = 25$). In the overall study population, no statistically significant improvement in skin elasticity was observed; however, subgroup analysis revealed a marked increase in elasticity among women aged 45–54 years after 6 and 12 weeks of supplementation. Participants also reported a perceived improvement in overall skin quality, although these changes did not reach statistical significance(Evans et al., 2021).

A randomized, double-blind, placebo-controlled trial by Miyanaga et al. aimed to determine the effects of oral collagen supplementation on skin hydration, transepidermal water loss (TEWL), and skin elasticity. The 12-week study included 97 Asian women aged 35–50 years who reported skin dryness and reduced elasticity. Participants were assigned to one of three groups: collagen peptide supplementation at a dose of 1 g/day ($n = 31$), collagen supplementation at a dose of 5 g/day ($n = 33$), or placebo ($n = 33$). The authors reported that supplementation with both higher and lower collagen doses resulted in a marked increase in stratum corneum hydration, with a stronger effect observed at the higher dose. Improvements were evident from week 8 of supplementation. No clear improvement in skin elasticity or significant changes in dermal parameters were observed(Miyanaga et al., 2021).

In a study by Sangsuwan and Asawanonda, the effects of four-week supplementation with hydrolyzed collagen on skin elasticity were evaluated, with additional comparison of effects in sun-exposed and sun-protected skin areas. The randomized controlled trial included 36 postmenopausal women aged 50–60 years who received marine collagen hydrolysate at a dose of 5 g/day. Skin elasticity was assessed using a cutometer at sun-exposed sites (left and right cheek) and sun-protected sites (left and right inner upper arm). Supplementation resulted in a significant improvement in skin elasticity in sun-exposed areas. The most pronounced effects were observed on the cheeks, where R7 values were higher than placebo both after 4 weeks

of supplementation and 4 weeks after its completion. No differences were observed in sun-protected areas. These findings suggest that collagen supplementation may be particularly beneficial for skin damaged by ultraviolet radiation(Sangsuwan & Asawanonda, 2021).

In a randomized, double-blind, placebo-controlled trial, Kim et al. evaluated the effects of oral low-molecular-weight collagen peptides (LMWCPs) on skin parameters in 64 women aged 40–60 years. Participants received fish-derived collagen peptides at a dose of 1 g/day for 12 weeks. The results demonstrated a pronounced improvement in skin hydration, which was significantly greater in the collagen group than in the placebo group at both 6 and 12 weeks ($p < 0.001$ and $p = 0.003$, respectively). After 6 weeks, the increase in skin hydration in the LMWCP group was more than sevenfold higher than in the placebo group, and nearly threefold higher after 12 weeks, indicating that hydration was the most prominent benefit of supplementation. Regarding elasticity, a moderate but statistically significant improvement was observed: R2 (overall elasticity) and R5 (net elasticity) parameters were higher compared with placebo after 12 weeks ($p = 0.025$ and $p = 0.027$), with only R5 also showing a significant improvement from baseline ($p = 0.002$). The R7 parameter did not change significantly. These findings suggest that LMWCPs exert their strongest effects on skin hydration, whereas their impact on elasticity, although present, is more limited and confined to selected measurement parameters(Kim et al., 2018).

4. Discussion

The presented results indicate that oral supplementation with hydrolyzed collagen may exert a beneficial effect on selected parameters of skin quality, particularly hydration and elasticity. However, this effect is neither unequivocal nor pronounced, suggesting that collagen does not function as a dominant factor but rather as a supportive component of the physiological processes occurring in the skin. Potential mechanisms underlying these observations include increased availability of amino acids required for collagen synthesis, stimulation of fibroblast activity, and improved organization of the extracellular matrix. Experimental data indicate that collagen digestion leads to the formation of short peptides, such as proline–hydroxyproline and glycine–glutamate, which may act as signals of matrix degradation. These peptides can attract fibroblasts and stimulate their activity, thereby supporting collagen remodeling processes in the skin. A potential effect of supplementation on epidermal barrier function cannot be excluded (Addor et al., 2018).

An important aspect of result interpretation is the dependence of the observed effects on the duration of supplementation and the type of preparation used. Beneficial changes were more frequently reported in long-term studies and with the use of low-molecular-weight collagen peptides, highlighting the importance of bioavailability and the potential signaling mechanisms of these compounds. At the same time, considerable heterogeneity of results, along with attenuation of the observed effects in analyses limited to studies of high methodological quality, underscores the need for cautious interpretation of the data and consideration of possible sources of systematic bias.

These findings suggest that collagen supplementation may be applied primarily as an adjunct to strategies aimed at supporting skin condition, particularly in populations exposed to intensified aging processes or photo-induced skin damage.

5. Conclusions

Analysis of the available studies indicates that oral supplementation with hydrolyzed collagen may, to some extent, contribute to improvements in selected parameters of skin quality, primarily hydration and elasticity. However, these effects are neither unequivocal nor clearly dominant, suggesting limited efficacy of this intervention as a stand-alone method for improving skin condition. The effectiveness of supplementation depends on several factors, including the type of preparation used, the molecular weight of collagen peptides, and the duration of the intervention. More consistent and reproducible outcomes have been observed in studies employing low-molecular-weight peptides and longer supplementation periods, underscoring the importance of bioavailability and sustained intake.

Substantial methodological heterogeneity across studies, encompassing differences in dosage, supplement composition, and outcome assessment tools, hinders direct comparison of results and limits the formulation of clear practical recommendations. This highlights the need for caution in interpreting the available evidence and in applying it to clinical and cosmetological practice. The current state of knowledge suggests that collagen supplementation may serve a complementary role within comprehensive strategies aimed at supporting skin condition, particularly in individuals experiencing pronounced aging processes or environmentally induced skin damage. Further research conducted in homogeneous populations and using

standardized protocols is required to more precisely define the clinical relevance and potential long-term effects of oral collagen supplementation.

Author Contributions:

Patrycja Markowicz was the principal and leading author of the study. She was responsible for the research concept and design, formulation of the study objectives, development of the literature search strategy, critical analysis and interpretation of the collected data, and preparation of the original draft of the manuscript. She also supervised the overall course of the study, coordinated the contributions of the co-authors, and performed the final revision of the manuscript.

Anna Skrzypek and Maciej Hutkowski contributed to the literature search and screening of abstracts, as well as to the selection of studies eligible for inclusion in the review.

Zuzanna Chwostek and Krzysztof Biłyk participated in data extraction from the included publications and assisted in organizing the collected data.

Paulina Biedroń and Bartłomiej Kosiarski contributed to the critical review of the manuscript and provided substantive comments on its content and structure.

Hanna Maruchniak, Wiktoria Marzec, and Mikołaj Zbrożek assisted in language editing, formatting of the manuscript, and verification of the reference list.

All authors read and approved the final version of the manuscript.

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