RESEARCH ARTICLE

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# A Study to Assess the Effect on Wrinkles of a Nutritional Supplement Containing High Dosage of Hydrolysed Collagen

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**Abstract:** Hydrolysed collagen consists of small peptides with low molecular weight, produced from native collagen found in bones, skin and connective tissue of animals, such as cattle, pigs and fish. Due to its low molecular weight, hydrolysed collagen is highly digestible, easily absorbed and distributed in the human body. If ingested, collagen peptides have been shown to be absorbed in the gut and delivered to the skin and joints. *In-vitro* and *in-vivo* studies have shown this may impact the skin ageing process. A double-blinded, randomised, placebo controlled study including 108 healthy volunteer subjects was performed to assess the efficacy of an anti-ageing food supplement containing high dosage of hydrolysed collagen, called Pure GOLD COLLAGEN®. Volunteers consumed the products daily for 12 weeks. Most subjects agreed Pure GOLD COLLAGEN® improved the condition of their skin, hair, nails and joints. The effect on the skin was investigated on a sub-group of the volunteers and significant improvements in the wrinkles were achieved, primarily in the surface area and length of wrinkles. Daily oral consumption of Pure GOLD COLLAGEN® for up to 12 weeks does lead to a detectable improvement in skin health. The observations noted in this preliminary study indicate that Pure GOLD COLLAGEN® is effective in improving the appearance of wrinkles of multiple depths and lengths.

## INTRODUCTION

The natural ageing process, termed intrinsic ageing, causes collagen fibres to become thicker and much shorter, leading to an increase in breakdown of collagen type I. [1] Collagen type I is the main component of human skin (80%) with collagen type III making up the remainder of skin collagen (15%). [2, 3] Another important skin component is hyaluronic acid. This is a high molecular weight polysaccharide, found mainly in the extracellular matrix of connective tissues. [4]

The aging process starts around mid-twenties and becomes more pronounced later in life. Both intrinsic and extrinsic ageing processes are controlled, respectively, by genetic variations and by extrinsic components including smoking, alcohol consumption and chronic sun exposure, [5] all of which increase the level of free radicals (reactive oxygen species, ROS) in the dermis, the deepest layer of the skin. ROS induce molecular destruction and consequently the loss of biological functions. [6] The formation of wrinkles, the appearance of brown spots and the thickening of the skin. [7, 8] Also, bony landmarks and blood vessels become more visible.

Many techniques, which can effectively combat visible signs of ageing: microderm abrasion, peels, lasers, photo-rejuvenation, fillers, botulinum toxin type A. However, these procedures can be expensive and some people are put off by the invasive nature of some of the treatments. The alternative is topical application of creams, lotions and serums. Several topical agents have been able to partially reverse photo-ageing; the retinoids are the most widely studied, followed by α-hydroxy acids [9, 10] and antioxidants (topical vitamin C, vitamin E, copper). [11, 12] Unfortunately, not all formulations are able to penetrate the thick epidermal layer in order to fight the appearance of wrinkles, which initiate much deeper in the skin.

Hydrolysed collagen consists of small peptides with low molecular weight (0.3 to 8 kDa), produced from native collagen found in bones, skin and connective tissue of animals, such as cattle, pigs and fish. The quality of the final hydrolysed collagen is dependent on its average molecular size, which can vary based on the methodology used to extract it. Generally, collagen molecules are denatured and partially hydrolysed to form gelatin (100 kDa). Gelatin can then be decomposed into small peptides using specific enzymes with cleavage activity (proteinase). Due to its low molecular weight, hydrolysed collagen is highly digestible, easily absorbed and distributed in the human body.

Proksch and colleagues investigated the effects of collagen hydrolysate on skin biophysical parameters related to cutaneous ageing, such as skin elasticity, skin moisture, trans epidermal water loss and skin roughness. In this double-blind, placebo-controlled study, 69 women aged between 35 and 55 years were randomized to receive collagen hydrolysate (2.5 g or 5.0 g) or placebo once daily for 8 weeks. At the end of the study skin elasticity in both collagen hydrolysate dosage groups showed a statistically significant improvement in comparison to placebo. With regard to skin moisture and skin evaporation, a positive influence of collagen hydrolysate treatment could be observed in a subgroup analysis. No side effects were noted throughout the study. [13]

In this article we present a study to investigate the efficacy of an oral liquid nutritional supplement containing hydrolysed collagen and its effect on improving the appearance of wrinkles. The product tested is called Pure GOLD COLLAGEN®.

## MATERIALS AND METHODS

To assess the efficacy of Pure GOLD COLLAGEN®, a double blind, parallel group, placebo controlled randomized clinical study was carried out on 108 healthy volunteer subjects over a 12 week period. The objective of this trial was to evaluate the effect of daily oral intake of 50 ml of Pure GOLD COLLAGEN® on skin, hair, nails and joints through observational assessment.

All procedures followed were in accordance with the ethical standards of the responsible committee on human

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**Table 1: Study Products and Ingredients**

| Ingredients in Product A (Pure GOLD COLLAGEN®) | Ingredients in Product B (Placebo) |
|---|---|
| Water | Water |
| Hydrolysed collagen | Glucose fructose syrup |
| Glucose fructose syrup | Citric acid anhydrous |
| Citric acid | Stabiliser (Soybean polysaccharide) |
| Soybean polysaccharide (stabiliser) | Peach flavour |
| Malic acid | DL-Malic acid |
| Ascorbic Acid (vitamin C) | Sucralose |
| Flavouring substances (peach flavour) | |
| Hyaluronic acid | |
| Borage oil emulsion (Borage oil 20%) | |
| d-alpha-tocopherol (vitamin E) | |
| N-acetylglucosamine | |
| Sucralose | |
| Zinc gluconate | |
| Pyridoxine hydrochloride (vitamin B6) | |
| Piper nigrum (Black pepper extract) | |
| Copper (cupric gluconate) | |
| D-Biotin | |
| Vitamin D3 | |

**Table 2: Observational Assessment, Questionnaire Results for Product A Compared to Placebo on Week 12**

| Percentage of People taking Pure GOLD COLLAGEN® Compared to Placebo who Agreed with the Benefits Stated in the Questionnaire |
|---|
| 66% more people using Pure GOLD COLLAGEN®, compared to placebo, agree skin is more elastic |
| 121% more people using Pure GOLD COLLAGEN®, compared to placebo, agree stretch marks are reduced |
| 113% more people using Pure GOLD COLLAGEN®, compared to placebo, agree hair is thicker |
| 52% more people using Pure GOLD COLLAGEN®, compared to placebo, agree hair is less brittle |
| 35% more people using Pure GOLD COLLAGEN®, compared to placebo, agree nails are less brittle |
| 64% more people using Pure GOLD COLLAGEN®, compared to placebo, agree joint pain is reduced |

experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 and 2008. The procedures were explained and an informed written consent was presented to and signed by each participant for being included in the study. Subjects were randomly assigned to 2 groups; one group was given product A (Pure GOLD COLLAGEN®) and the other product B (placebo; Table 1). Those with an allergy to any of the ingredients to the test products likely to interfere with the study were excluded. The product was distributed to the participants according to their respective group identity, A or B. Instructions related to product ingestion were given to the participants; the supplement was to be taken daily, for a period of 12 weeks, in the morning before breakfast. Subjects were required to continue with their regular use of moisturisers, cosmetics, wash products and toiletries during the course of the study. Subjects were asked to avoid direct sunlight or sun beds during the course of the study. The subjects' view of the oral supplement was compared before and after treatment through analysis of information obtained from self-evaluation questionnaires.

The anti-wrinkle efficacy of the supplement was further tested on 17 of the subjects. These were healthy Caucasian female subjects, aged 45 to 64 years. Subjects with a recent history (previous 12 months) of significant skin disease e.g. eczema, were excluded. Nine subjects from group A and 8 subjects from group B completed the study. Change in wrinkle parameters was assessed by the investigator using Visioline® (www. courage-khazaka.de) on week 0, 3, 6, 9 and 12. The following parameters were analysed: total surface area of wrinkles (in $\mu m^2$), total length and mean length of wrinkles (in μm). Statistical analysis was carried out on such parameters. The results were compared with those obtained on day 0 for each group and between groups, using Wilcoxon test and Mann-Whitney U-test, respectively.

## RESULTS

### Observational Assessment

A questionnaire comprised of two parts was provided to the 108 subjects. The first section was completed by the subjects at baseline (Week 0) and the second section was completed by subjects at the end of the trial (Week 12). The treatment generated favourable comments from the volunteers. The test product was favoured at a high level (Table 2).

### Area Occupied by Wrinkles

The area occupied by wrinkles was significantly ($p \leq 0.05$) reduced by 19% after 9 weeks in the group treated with product A (Figure 1A). This was not observed for subjects treated with placebo. The difference between the treated group and placebo was not significant.

Moreover, the significant improvement detected with product A at week 9 exhibited a correlation with baseline

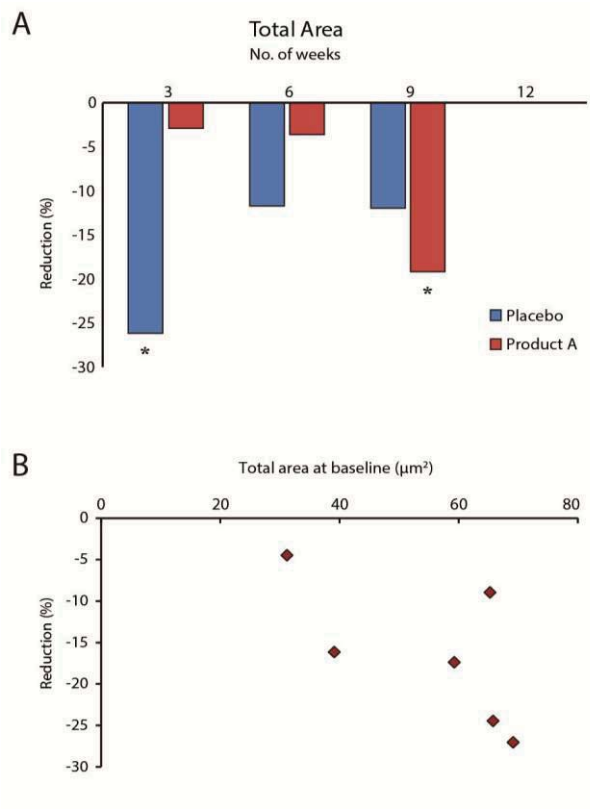


**Figure 1:** (A) Comparative profilometry results for total area of wrinkles in patients using product A (in red) or placebo (in blue). (B) Percentage decrease at 9 weeks against total area of wrinkles at baseline. Stars indicate significance of p≤0.05 when compared with week 0

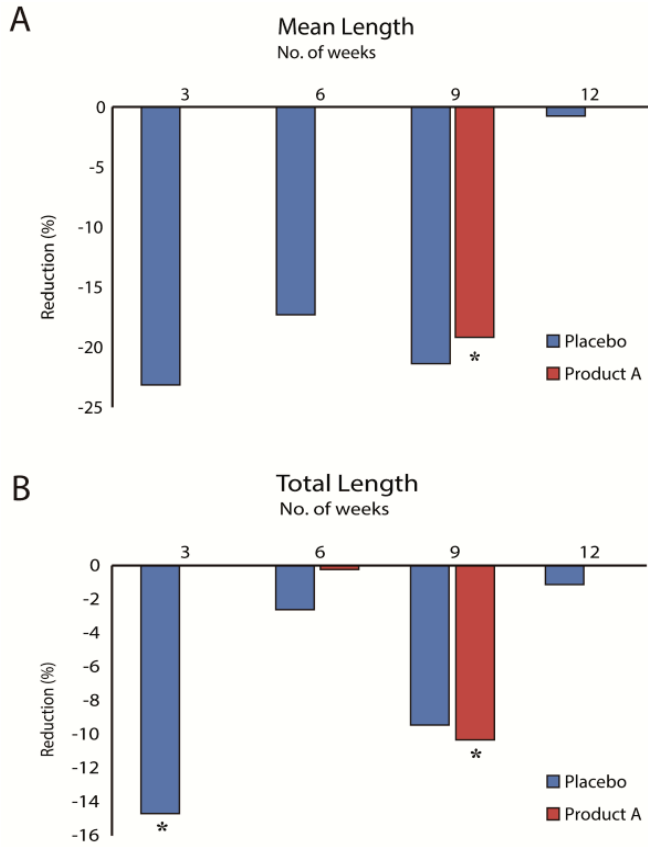


**Figure 2:** Comparative profilometry results for mean length of wrinkles (A) and total length of wrinkles (B) in patients using product A (in red) or placebo (in blue). Stars indicate significance of p≤0.05 when compared with week 0

wrinkle surface area: the higher the initial area, the greater the reduction at week 9 (Figure 1B).

**Mean Length of Wrinkles**

The mean length of wrinkles was significantly reduced (p≤0.05) by 19% after 9 weeks in the patients using product A (Figure 2A).

**Total Length of Wrinkles**

The total length of wrinkles in patients using product A was significantly reduced by 10% after 9 weeks (p≤0.05; Figure 2B). A significant difference was not observed between patients using placebo and those taking the product.

In summary, significant reductions in wrinkle parameters were measured in patients using product A. These reductions were progressive over time, with improvements of 19% reduction in total surface area and mean length of wrinkles and 10% reduction in total wrinkle length by week 9. Even though improvements were also observed with placebo, these were to a lesser degree and were not progressive.

**DISCUSSION**

Detailed analysis of the numerical measurements recorded during the clinical study show that daily oral consumption of product A for up to 12 weeks does lead to a detectable improvement in skin health. The clinical trial results verify that regular intake of product A improves the basic skin condition. Indeed, out of 108 subjects 66% more subjects taking product A compared to placebo confirmed that their skin became more elastic. Apart from elasticity, over twice as many more subjects (121%) taking product A agreed that their stretch marks had reduced compared to placebo group. These results indicate that product A improves the overall skin condition and function.

This study also suggests there are benefits of product A on hair, nails and joints. In fact, 113% more subjects taking product A felt their hair had become thicker. This is most likely because product A strengthens the hair shaft in the dermal layer of skin and thus prevents breakage. Indeed, 52% more subjects taking product A compared to placebo agreed that their hair had become less brittle. In addition subjects taking product A reported that their nails had become less brittle; 35% higher than those taking the placebo drink. From these results it appears that product A improves all aspects of the skin.

Finally, 64% more subjects who took product A compared to placebo said their joint pain had reduced, which indicates that, apart from benefiting skin, hair and nails, product A may also improve joint health, providing further evidence that the drink acts on the whole body. We therefore conclude that oral intake of product A can offer real benefits to many individuals with ageing skin, hair and joints.

Significant reductions in wrinkle parameters, including surface area, total length and mean length, were measured for patients using product A. Although improvements for these parameters were also observed in the group using placebo, they were not as consistent. The average reduction in the total surface area of wrinkles was 19% at 9 weeks, almost twice the average reduction associated with placebo. The mean length and total length of the wrinkles in group A diminished by 19% and 10%, respectively.

The fact that people taking product A showed consistent significant decline in area and length of wrinkles at week 9, a result not seen with placebo, suggests the formula associated with this product, which contains as active ingredients hydrolysed collagen and hyaluronic acid, among other key vitamins, has anti-ageing properties.

The results obtained with product A were found to be progressive, whereas there was a lack of trend in the results obtained from the placebo group. Even though an initial benefit was detected by using placebo, it is unlikely the improvement observed was due to real physical changes as it disappeared on further visits.

## CONCLUSION

The observations noted in this preliminary study indicate that product A is effective in improving the appearance of wrinkles of multiple depths and lengths. It would be of value to assess the level of wrinkle reduction in a larger group of people and for a longer period (i.e. beyond the 12 week test period).

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