EFFECT OF HESPERIDIN AND ITS STRUCTURAL PART HESPERETIN, RUTINOSE AND RHAMNOSE ON COLLAGEN I AND MATRIX METALLOPROTEINASE 1 PRODUCTION IN THE NORMAL DERMAL HUMAN FIBROBLASTS.

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Introduction

Aging of the skin is a multisystemic degenerative process caused by internal and external factors. Chronological aging is associated with accumulation Advanced Glycation End products (AGEs). AGEs are formed by non-enzymatic reaction between reducing sugars and protein side chains[1]. Their overproduction plays a important role in the pathogenesis of diabetic complications, oxidative stress, chronic inflammation as well as natural aging of skin tissue that is associated with the degradation of extracellular matrix components such as collagen and elastin[2]. Therefore, natural substances able to inhibit the formation of AGEs could be an interesting strategy to prevent skin aging.

This study aimed to determine ability of hesperidin, hesperetin, rutinose and rhamnose to affect matrix metalloproteinase 1 (MMP-1; interstitial collagenase) and collagen 1 production in normal human dermal fibroblasts (NHDFs).

Methods

- determination of subtoxic concentrations of tested substances - hesperidin, hesperetin (1 and 10 µM), rutinose, rhamnose (1 and 10 mM)
- preparation of skin aging models – young (2nd-3rd passages) and physiologically aged (15th – 16th passages) NHDFs cultivated in low glucose, high glucose or AGEs supplemented medium
- measuring levels of MMP-1 and collagen 1 in culture medium by Enzyme-Linked Immunosorbent Assay (ELISA)

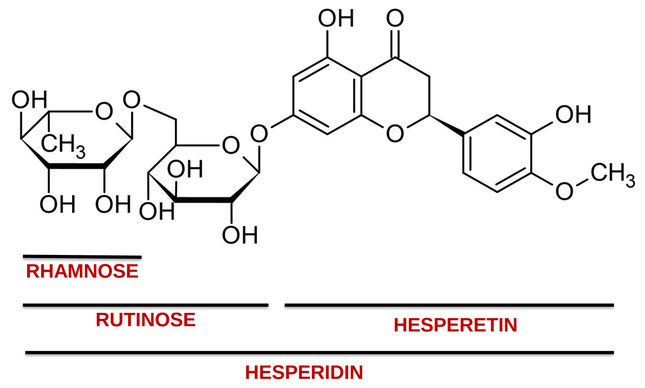

Fig.1: Structure of hesperidin and its main constituents.

Results

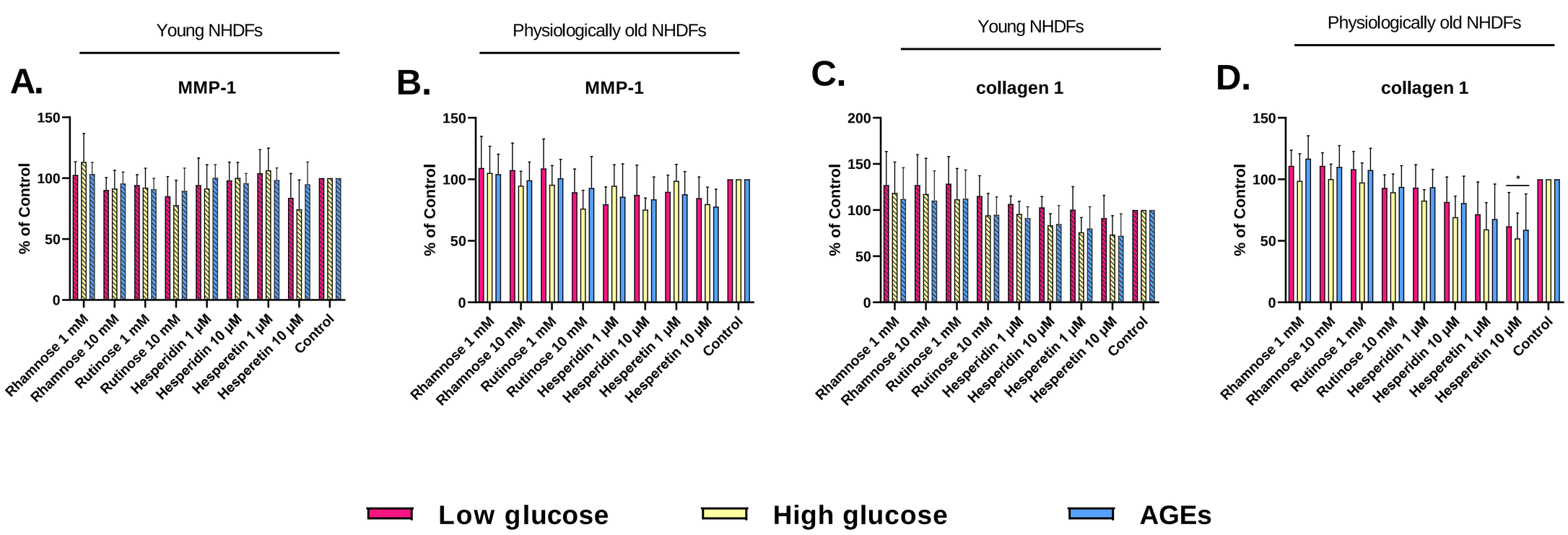

Fig. 2: The effects of rhamnose, rutinose, hesperidin and hesperetin on MMP-1 (A) and collagen 1 (C) production by young NHDFs, that were cultivated in low glucose medium, high glucose medium and medium supplemented with AGEs and the effects of rhamnose, rutinose, hesperidin and hesperetin on MMP-1 (B) and collagen 1 (D) production by physiologically aged NHDFs, that were cultivated in low glucose medium, high glucose medium and medium supplemented with AGEs. Untreated NHDFs cultured in these individual media were used as controls.
Number of measurements: n = 6. *P < 0.05 were considered significant compare to control. (One-way ANOVA; Dunnett's multiple comparisons test were performed using GraphPad Prism)

Conclusion

Our study demonstrated the anti-aging potential of rutinose, rhamnose, hesperidin, and hesperetin.

The level of MMP-1 was reduced after the application of all tested compounds in both young aged and physiologically aged NHDFs. Collagen I production was increased after the application of rhamnose and rutinose. In contrast, collagen I production was reduced after the treatment with flavonoids, hesperidin and hesperetin.

References

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