

In vitro determination of the anti-aging potential of four southern Africa medicinal plants

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INTRODUCTION

Aging is an inevitable process for all living organisms that increases reactive oxygen species leading to the dysregulation of extracellular and intracellular homeostasis, ultimately resulting in the skin not functioning optimally. The level of antioxidants, hyaluronic acid and two proteins, elastin and collagen, all play a pivotal role in regulating the aging process as they are all involved in maintaining the elasticity, flexibility and the strength of the skin^{1,2}.

People living on the African continent are exposed to the harsh sun and rarely use skin protective agents as they are expensive. It is for this reason that four southern African medicinal plants used indigenously as cosmetics agents and/or exhibited good antioxidant activity in previous studies were explored for their potential use as anti-aging reagents. In this study the anti-collagenase, anti-hyaluronidase and anti-elastase activity of the plants *Clerodendrum glabrum* (PA), *Schotia brachypetala* (SB), *Psychotria capensis* (PC) and *Peltophorum africanum* (PA) were investigated.

PLANT COLLECTION AND EXTRACT PREPARATION

Plant were collected by a botanist and the identity confirmed by the South African National Biodiversity Institute where voucher specimens were deposited. Plants (20 g) were dried and ground and extracted with 100% MeOH and 100% EtOAc, separately using a Buchi Accelerated Speed Extractor E916. The resultant extracts were evaporated under vacuum at 40°C and stored at 4°C until use.

MATERIALS AND METHODS

Anti-elastase activity was determined according to the method of Kraunsoe *et al.*³ The method of Moore and Stein with modifications by Mandl *et al.*⁴ was used to determine anti-collagenase activity whilst the fluorimetric Morgan-Elson assay method of Reissig *et al.* (1955) and modified by Takahashi *et al.* (2003)⁵ was followed. Figure 1 illustrates the method followed in testing the anti-hyaluronidase activity of the extracts. This method was also followed for the elastase and collagenase assays using different enzymes, substrates, staining reagents and positive controls. The final test concentration in all three assays was 200 µg/ml. The results are given as percentage inhibition.

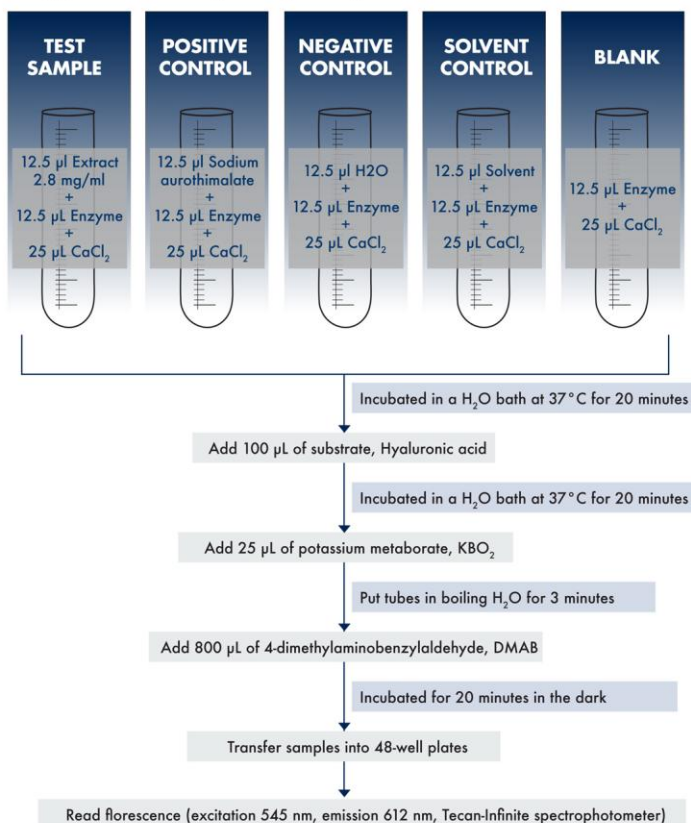


Figure 1: Method followed to test the anti-hyaluronidase inhibitory activity of plant extracts.

RESULTS AND DISCUSSION

To the knowledge of authors, this is the first study to investigate the anti-elastase, anti-collagenase and anti-hyaluronidase activity of *C. glabrum*, *P. capensis*, *P. africanum* and *S. brachypetala*. These plant extracts were found to have good inhibitory activity against elastase and collagenase (Figures 2 & 3). This suggests that they can help restore skin elasticity thereby slowing the wrinkling process. All four plants show potential to be developed into anti-aging compounds, with *P. africanum* being the most promising.

The tested plants did not exhibit significant anti-hyaluronidase activity. The methanol bark extract of *S. brachypetala* bark inhibited hyaluronidase activity the most, 75.13 ± 7.49%. The methanol extracts of *P. capensis* leaves (52.98 ± 0.66%) and *P. africanum* leaves (49.32 ± 6.58%) and bark (48.46 ± 6.77%) exhibited moderate inhibition.

Twenty-two extracts inhibited the enzyme by more than 50%, with nine of these inhibiting the enzyme by more than 80% (Figure 2). The ethyl acetate extracts of *C. glabrum* stems and *P. africanum* bark and stems and *S. brachypetala* bark and leaves contained activity higher than the positive control, EDTA (83.75 ± 2.89%).

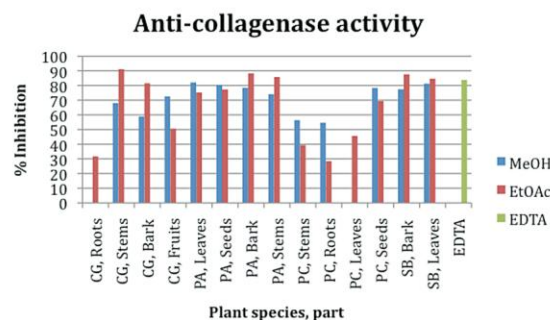


Figure 2: Anti-collagenase activity of plant extracts.

Twelve samples inhibited elastase by ≥ 80% (Figure 3). The ethyl acetate extracts of *P. capensis* leaves (92.84 ± 1.13%) and *S. brachypetala* bark (93.73 ± 0.51%) had activity comparable to elafin (93.09 ± 4.10%).

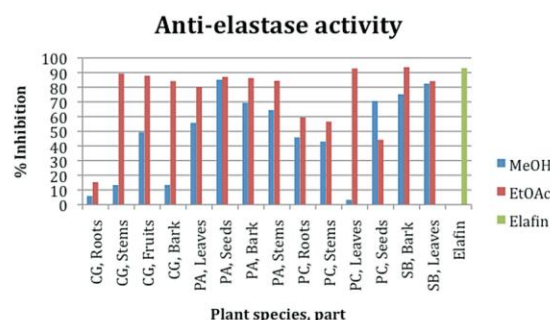


Figure 3: Anti-elastase activity of plant extracts.

CONCLUSION

All four plants were found to contain anti-aging activity *in vitro* with *P. africanum* being the most promising as it showed good results in all enzyme assays. This work has led to the identification of plants which can further be investigated for the development of use in anti-aging products. Isolation of active compounds is currently underway.

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