

## Evaluation of the *In vitro* Antioxidant and Anti-inflammatory Potentials of *Artemisia arborescens* Aqueous and Hydroethanolic Extracts : Insights from Moroccan Ethnopharmacology.

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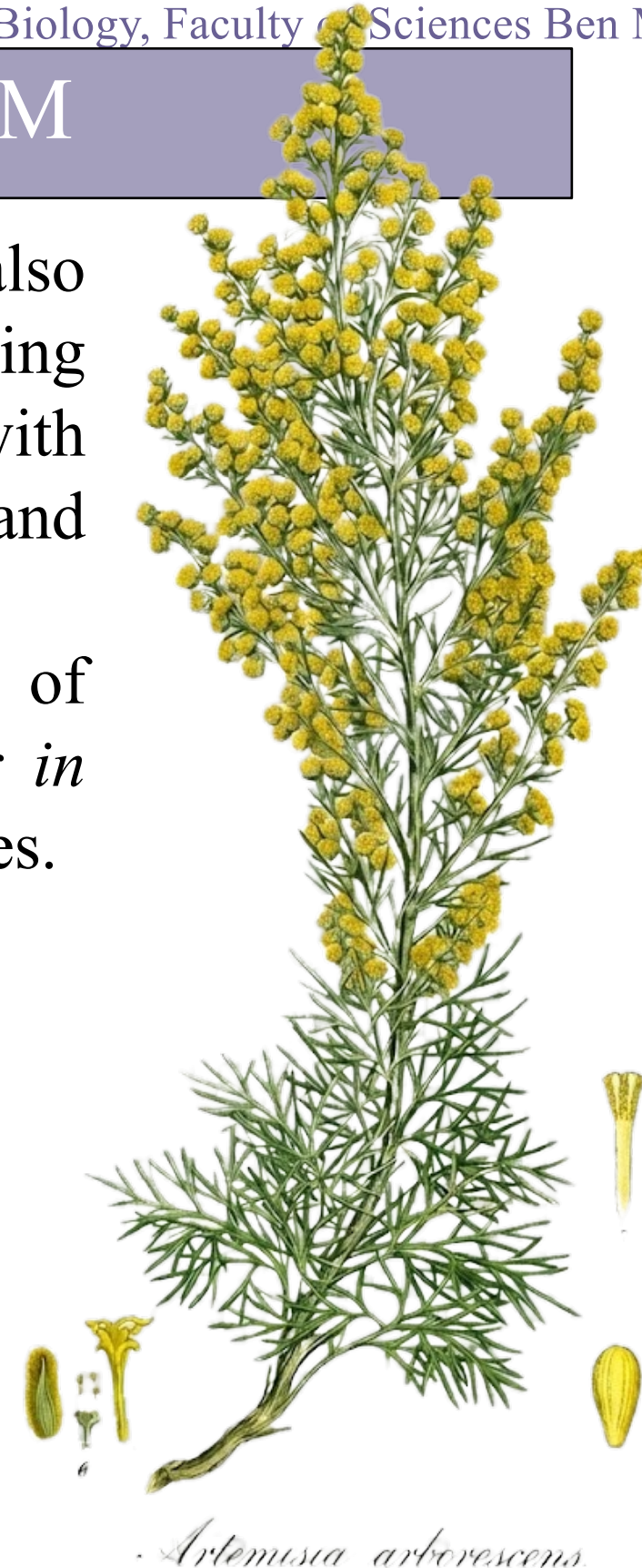
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### INTRODUCTION & AIM

*Artemisia arborescens* (*A. arborescens*), also known as tree wormwood, holds a long-standing place in Moroccan traditional medicine, with increasing attention on its pharmacological and therapeutic potential [1,2].

This study evaluates the phytochemicals of aqueous and hydroethanolic extracts, and their *in vitro* antioxidant and anti-inflammatory properties.



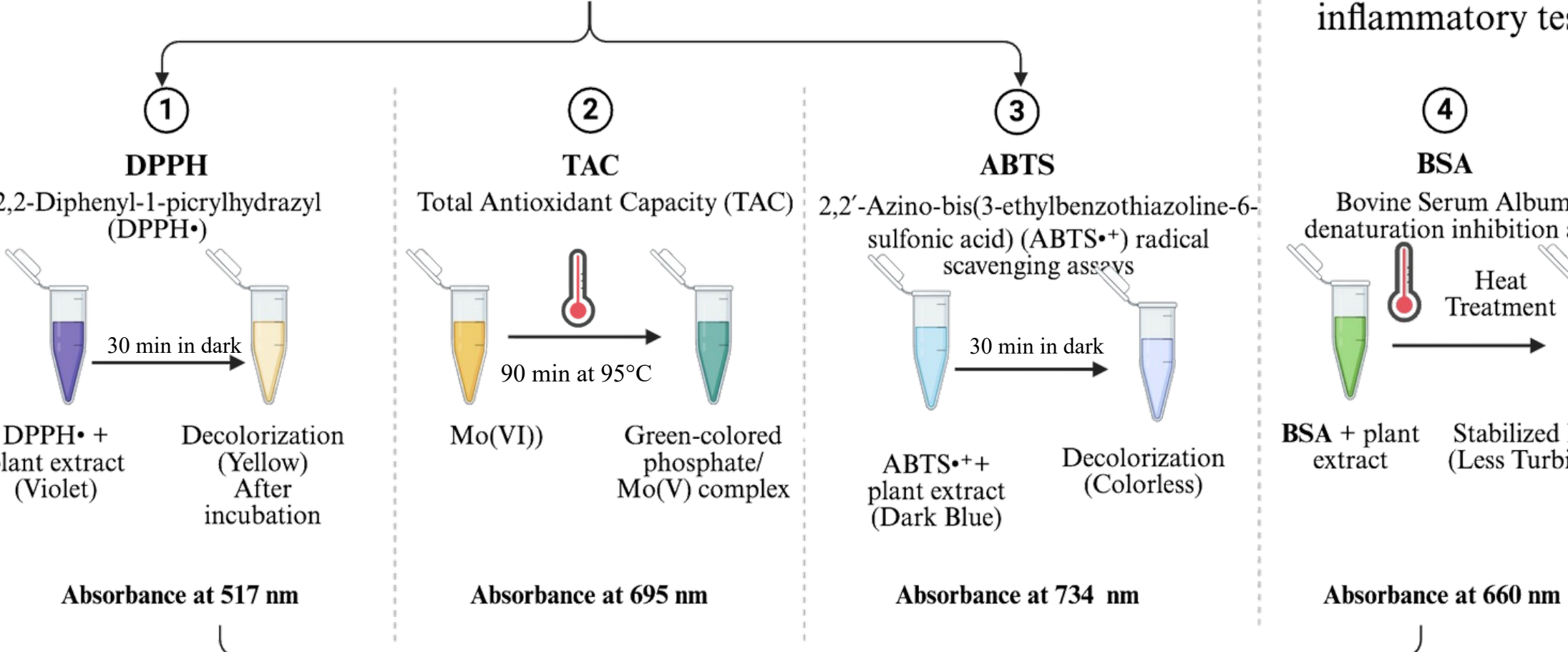
### METHODS

Aerial parts of *A. arborescens* L. were collected in Toualet-Settat (32.74010° N, 7.68270° W), Morocco (February 2025). The plant material was shade-dried for 3 weeks, ground to a fine powder, and macerated in distilled water (30 g in 300 mL, 1:10 w/v) at room temperature for 72 hours. The extract was filtered and concentrated using a rotary evaporator.

#### Phytochemical Analysis

- **Total phenolics:** Folin - Ciocalteu method (mg GAE/gDM)
- **Total flavonoids:** Aluminium chloride method (mg QE/gDM)
- **Condensed tannins :** Vanillin-HCl method (mg CE/gDM)
- **Total Flavonols:** Aluminium & Sodium Acetate method (mg QE/gDM)

#### *In vitro* Antioxidant tests



### RESULTS & DISCUSSION

Table 1: Qualitative Phytochemical Screening of *A. arborescens*

Phytochemical Compound	Aqueous Extract	Hydroethanolic Extract
Phenols	+	+
Flavonoides	+	+
Flavones	+	-
Saponins	+	+
Catechin tanins	-	-
Coumarins	+	+
Alkaloids	+	+
Sterols	+	+
Terpenoides	+	+

Table 2: Phytochemical contents of *A. arborescens* Extracts

	Aqueous Extract	Hydroethanolic Extract
<b>Total Phenols</b>	15.75 ± 0,97 mg AGE/g MS	21.30 ± 1.10 mg AGE/g MS
<b>Flavonoids</b>	18.51 ± 0.64 mg QE/g MS	24.80 ± 0.80 mg QE/g MS
<b>Tannins</b>	0.615 ± 0.150 mg CE/g MS	0.550 ± 0.120 mg CE/g MS
<b>Flavonols</b>	2.99 ± 0.09 mg QE/g MS	4.10 ± 0.15 mg QE/g MS

The phytochemical screening revealed that both *A. arborescens* extracts possess a rich profile of bioactive compounds. Flavones were detected in the aqueous extract, while catechin tannins were absent in both. Quantitatively, the hydroethanolic extract exhibited a superior yield of bioactive compounds compared to the aqueous extract, with significantly higher concentrations of total phenols, flavonoids, and flavonols. Conversely, tannin content was slightly higher in the aqueous extract.

#### Antioxidant Activity (Fig 1-3):

- **Dose-Dependency:** Both extracts showed a dose-dependent antioxidant activity in DPPH, TAC, and ABTS assays.
- **Comparative Potency:** The Hydroethanolic Extract (HE) consistently demonstrated higher scavenging activity compared to the Aqueous Extract (A), particularly in the ABTS assay (Figure 3).
- **Standard vs. Extract:** While significantly active, both extracts showed lower potency compared to the standard (Ascorbic Acid). Results are expressed as means ± SD (n=3). p < 0.0001

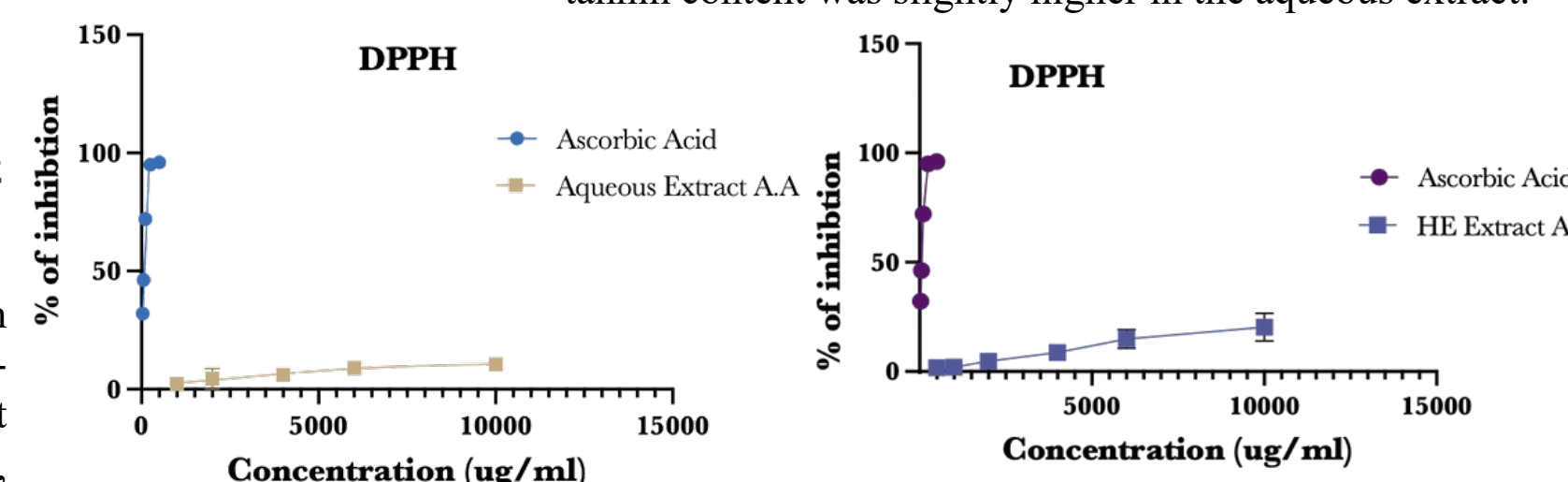


Figure 1: DPPH• Radical scavenging activity by *A. arborescens* HE and A Extracts

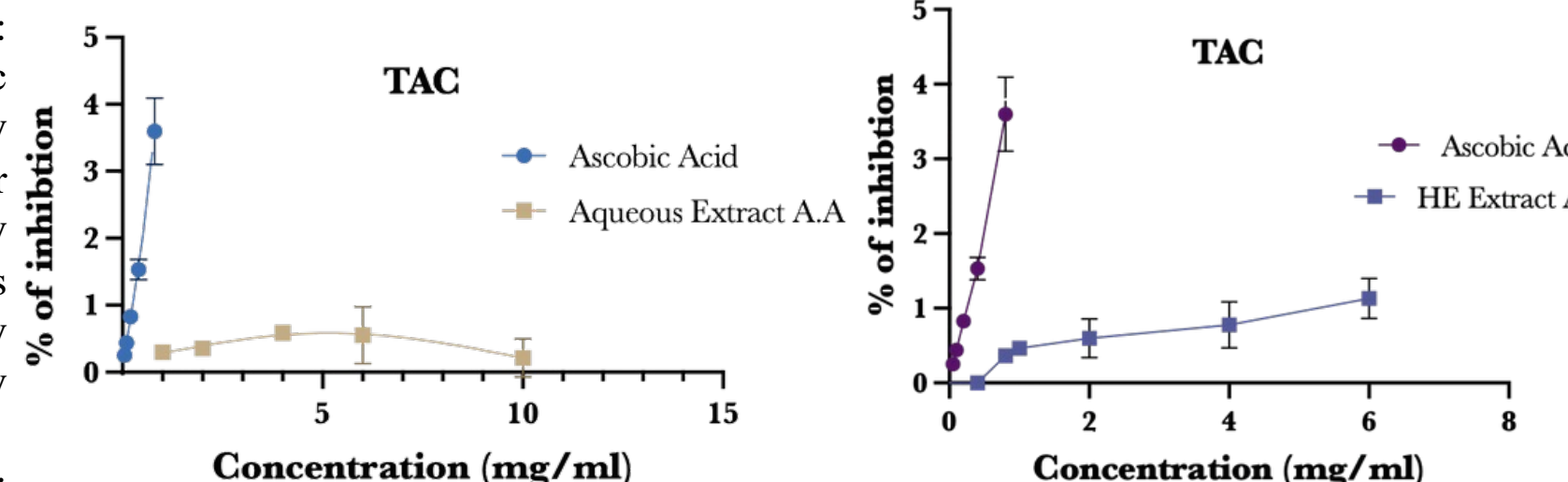


Figure 2: Total Antioxidant Capacity of *A. arborescens* HE and A Extracts

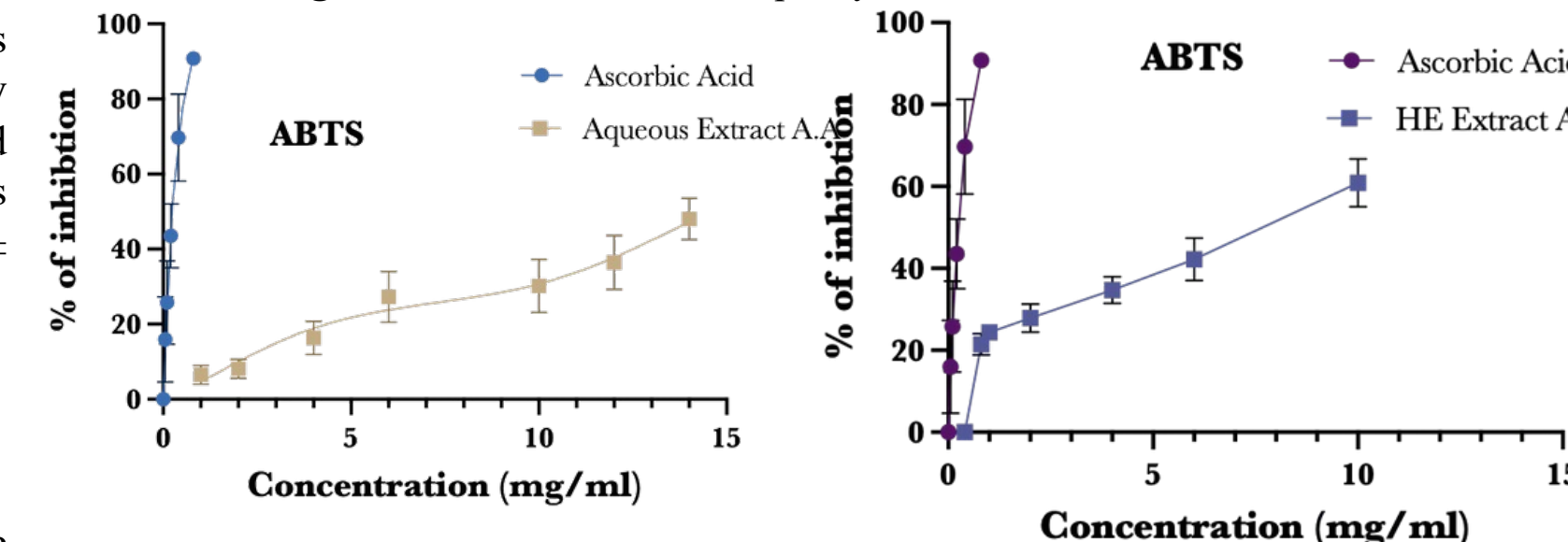


Figure 3: ABTS•+ Radical scavenging activity by *A. arborescens* HE and A Extracts

#### Anti-inflammatory Activity (Fig 4):

- **Protein Protection:** The Aqueous Extract exhibited remarkable anti-inflammatory potential, achieving high inhibition of BSA denaturation (~80%), surpassing the activity of the Hydroethanolic extract (~50%). Results are expressed as means ± SD (n=3). p < 0.0001

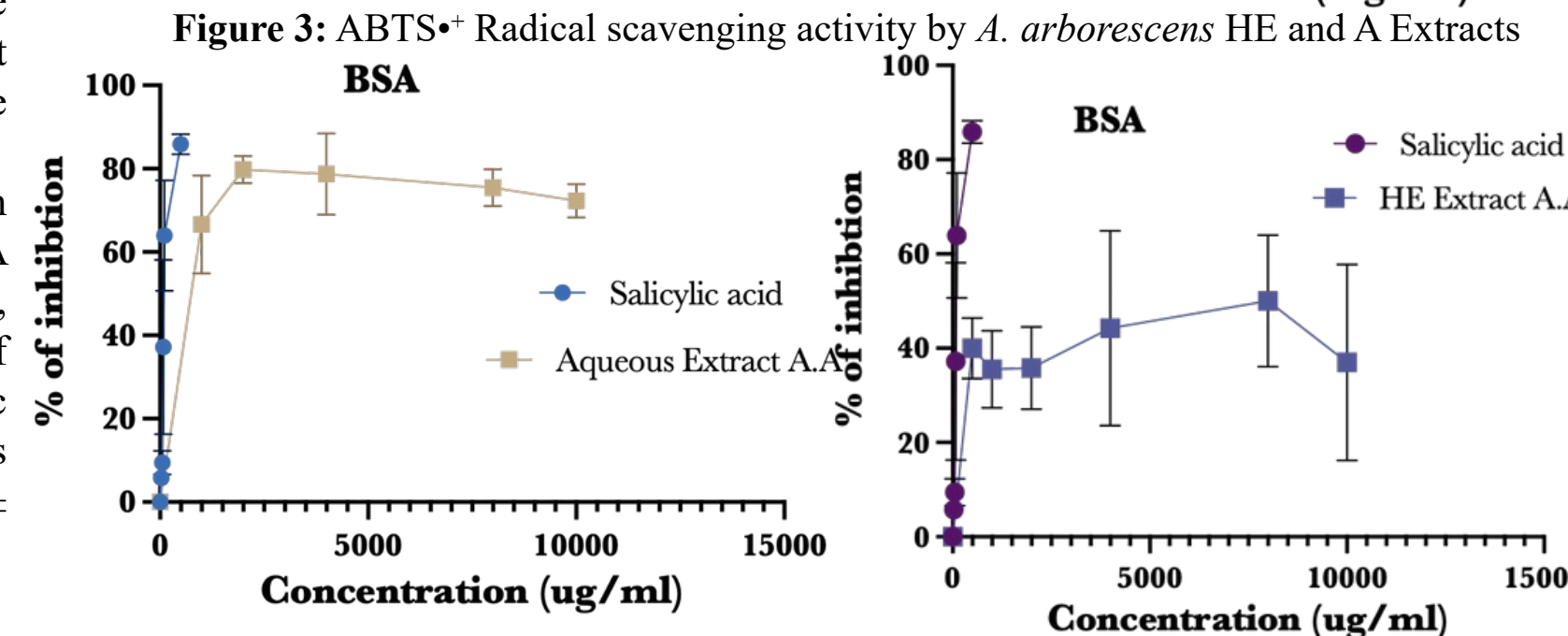


Figure 4: Inhibition of Protein Denaturation by *A. arborescens* HE and A Extracts

### CONCLUSION

- Hydroethanolic extract excels in antioxidant capacity, while Aqueous extract dominates anti-inflammation.
- Results validate the dual therapeutic potential of *A. arborescens* in traditional medicine.
- Future mechanistic investigation and *in vivo* trials are recommended.

### FUTURE WORK / REFERENCES

1. Michelakis EC, Evergetis E, Koulocheri SD, Haroutounian SA. Exploitation of *Artemisia arborescens* as a renewable source of chamazulene: seasonal variation and distillation conditions. *Nat Prod Commun.* 2016;11(10):1513-1516.
2. Polito F, Papianni M, Woo SL, Malaspina P, Comara L, De Feo V. *Artemisia arborescens* (Vahl.) L.: micromorphology, essential oil composition, and its potential as an alternative biocontrol product. *Plants (Basel).* 2024;13(6):825.
3. El Faqer O, Rais S, Elkoraichi I, El Amrani A, Dakir M, Zaid Y, Mtaïrag EM. Phytochemical characterization and immunomodulatory effects of aqueous and ethanolic extracts and essential oil of Moroccan *Laurus nobilis* L. (Lauraceae) on human neutrophils. *J HerbMed Pharmacol.* 2022;12(1).
4. Ouadghiri Z, El Faqer O, Wahnou H, Soudassi A, Marnissi F, Rais S, Mtaïrag EM. *In vivo* and *in vitro* assessment of *Marrubium vulgare*: chemical, antioxidant and anti-inflammatory profiles. *Arab J Sci Eng.* 2025;1-13.

$$\text{Inhibition} = \left( \frac{A_{\text{control}} - A_{\text{sample}}}{A_{\text{control}}} \right) \times 100$$