

## ABSTRACT

*Polygonum bellardii* All. (*P. bellardii*) is an annual plant that thrives in dry areas of reclaimed land. Halophytes such as *P. bellardii* have evolved unique physiological adaptations to survive extreme environments, including the accumulation of bioactive compounds like polyphenols and flavonoids. In this study, we investigated the mechanism of melanogenesis and tyrosinase activity of *P. bellardii*. The plant was extracted using 70% ethanol (PBE) through ultrasonic extraction. MTT assays were performed to evaluate the cytotoxicity of the *P. bellardii* extract on B16F10 cells, a mouse-derived melanocyte cell line. To assess the inhibitory effect of PBE on melanogenesis, we measured melanin content and tyrosinase activity after 72 hours of treatment. The extract exhibited no cytotoxicity at concentrations up to 100 µg/ml, which was deemed appropriate for the study. Furthermore, treatment with PBE at 100 µg/ml resulted in a 73.80% reduction in melanin production compared to the control group treated with α-MSH (100%), and tyrosinase expression was inhibited by 16.59%. These findings suggest that the 70% ethanol extract of *P. bellardii* has potential as a whitening agent by inhibiting α-MSH-induced melanin production.

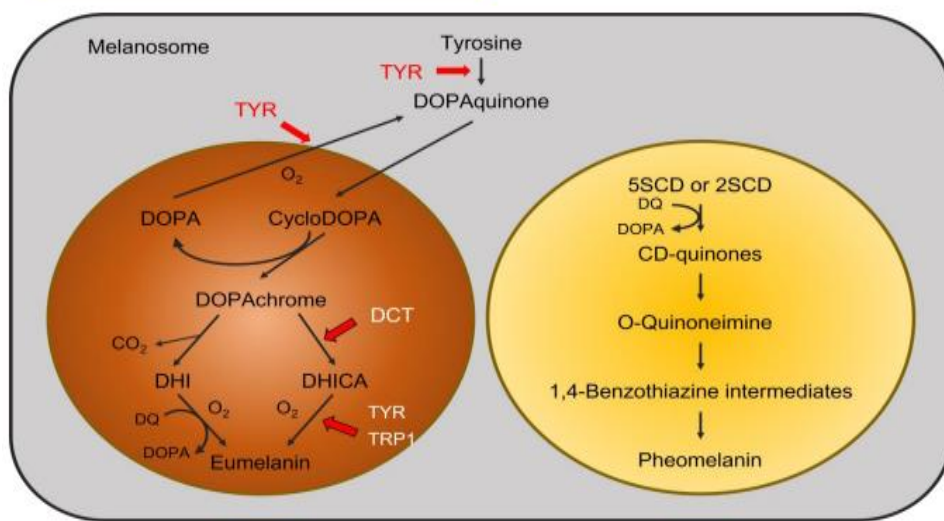
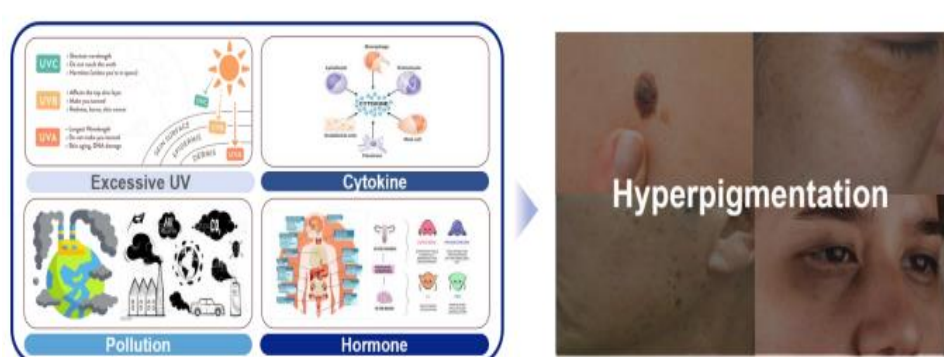
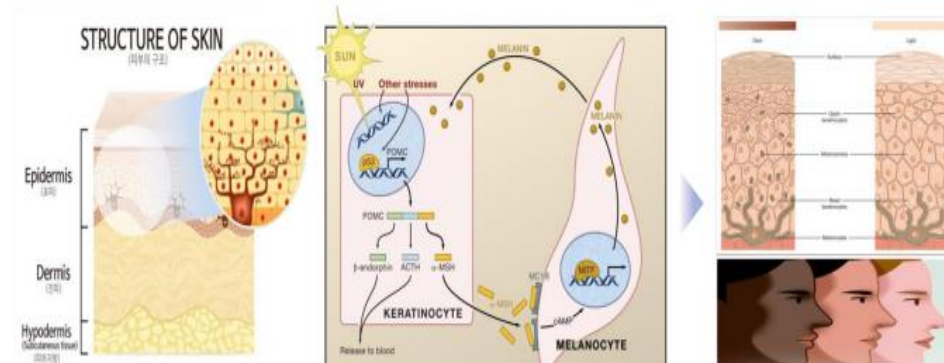
## INTRODUCTION

### ▲ *Polygonum bellardii* All. (*P. bellardii*)



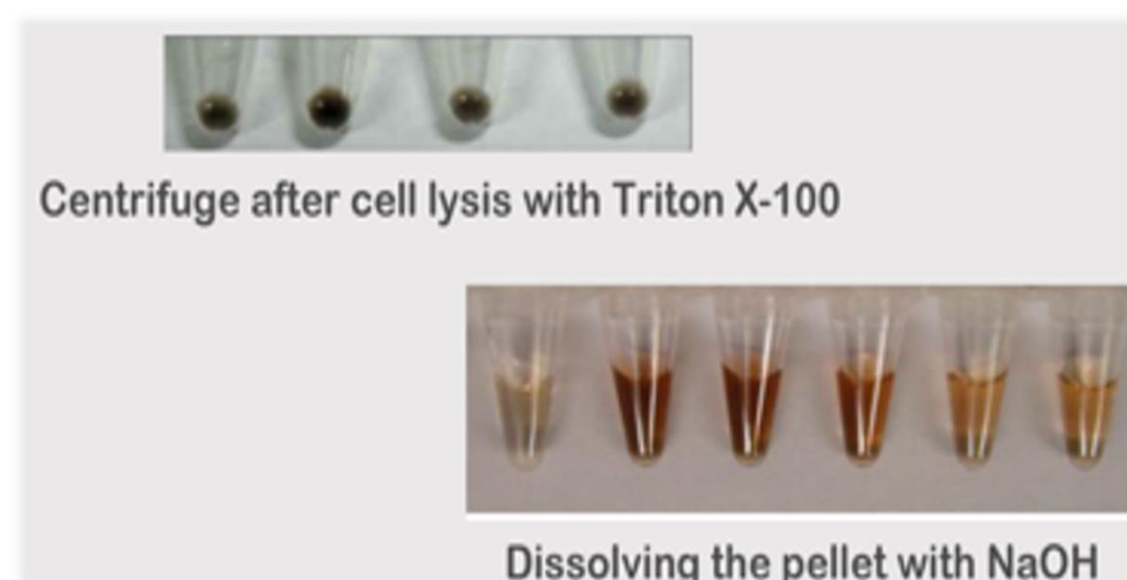
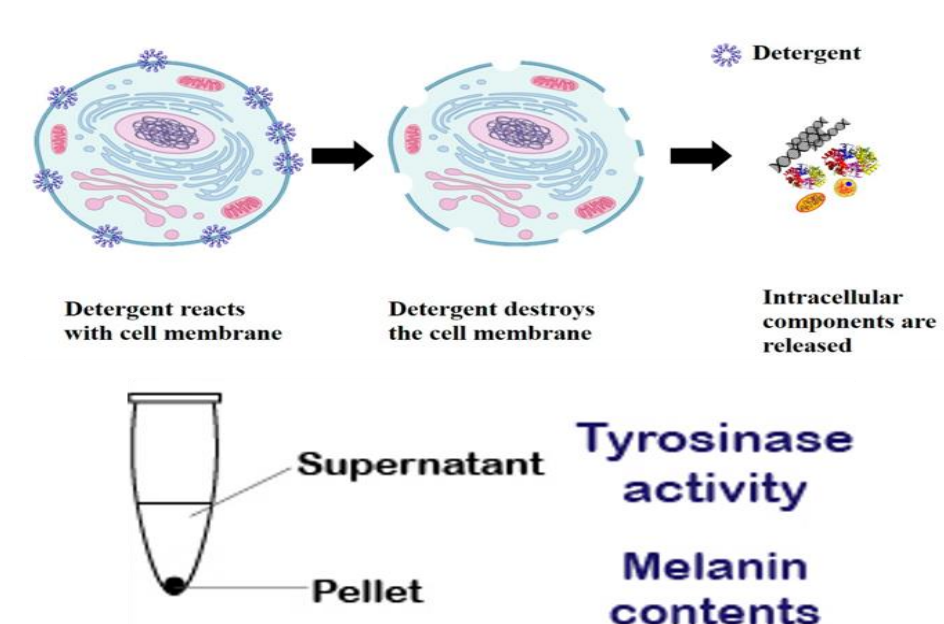
- Halophytes are specialized plants that thrive in the highly saline environments of seashores. These plants have evolved to survive and flourish in conditions where most other plants would struggle.
- Halophytes are renowned for their unique and complex physiological mechanisms, which enable them to resist and adapt to extreme conditions such as high salt concentrations, prolonged periods of dryness, and strong winds.
- Halophytes contain various significant bioactive compounds, such as polyphenols, steroid, flavonoids, fatty acids, tannins, alkaloids and terpenoids.
- These extracts are known to possess a range of bioactive compounds, which can offer various health benefits and hold potential for therapeutic applications.

### ▲ Melanin synthesis process

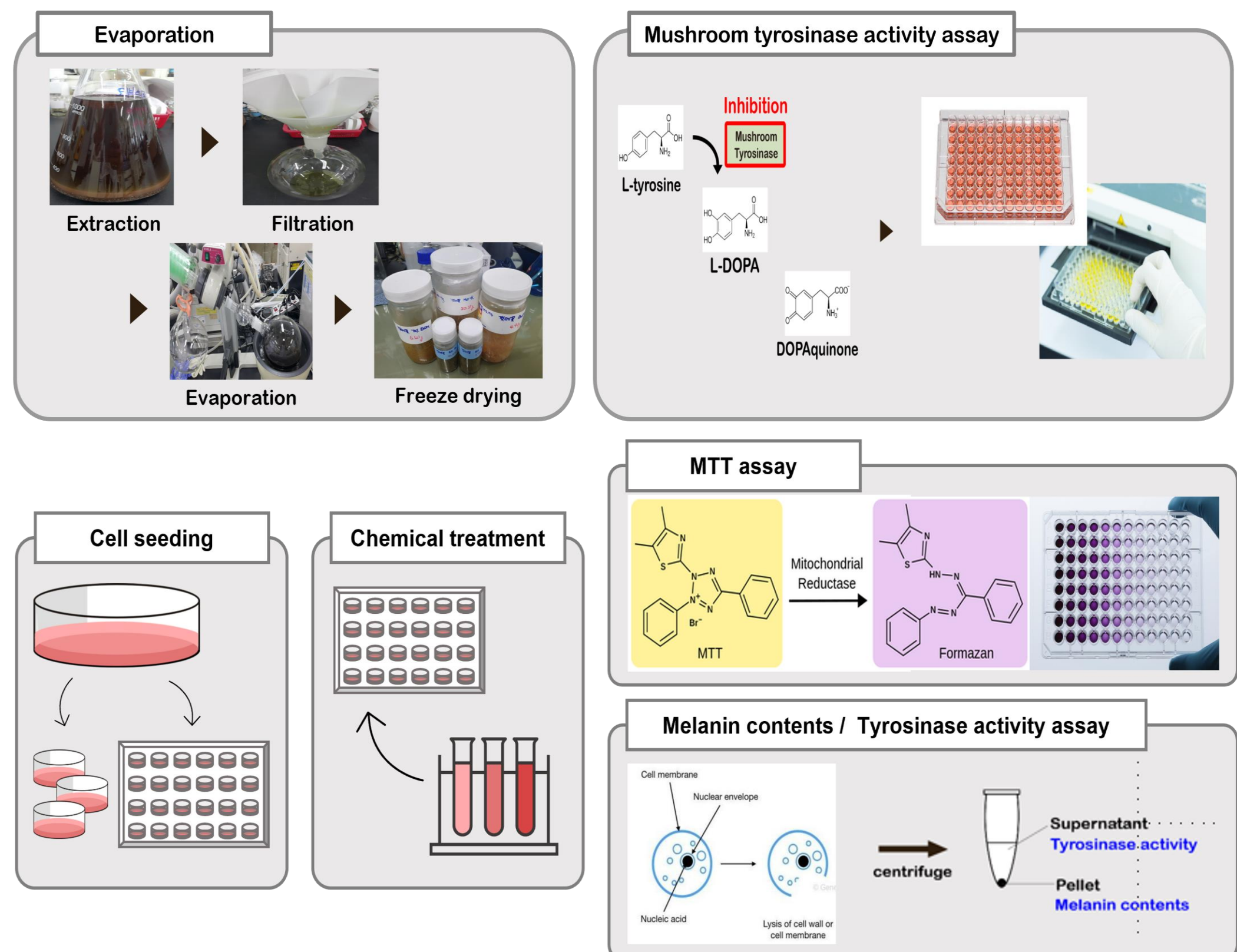


- Melanocytes in the basal layer of the epidermis transfer melanin pigment protects the skin from UV rays and irritants, and the amount of melanin determines the skin color.
- Hyperpigmentation is increasing due to excessive UV rays, environmental pollutants, cytokines, and hormones.
- Activated Mc1r stimulate melanogenesis by activating cAMP in the melanocyte-specific pathway, cAMP response element-binding protein (CREB) induces microphthalmia-associated transcription factor (MITF) expression.
- Activated MITF, known as a transcription factor for melanogenesis, up-regulates melanocyte-specific enzymes, Tyrosinase (Tyr), Tyrosinase related protein-1 (TRP-1), and Dopachrome tautomerase (DCT), and induces melanin biosynthesis.
- As a result, melanin biosynthesis proceeds in melanosome.
- Melanin synthesis begins the conversion of L-tyrosine to 3,4- dihydroxyphenylalanine (L-DOPA) and then the oxidation of L-DOPA yields DOPA quinone by tyrosinase enzyme, catalyzing the rate-limiting step for the melanin biosynthesis.

### ▲ Measurement of melanin contents

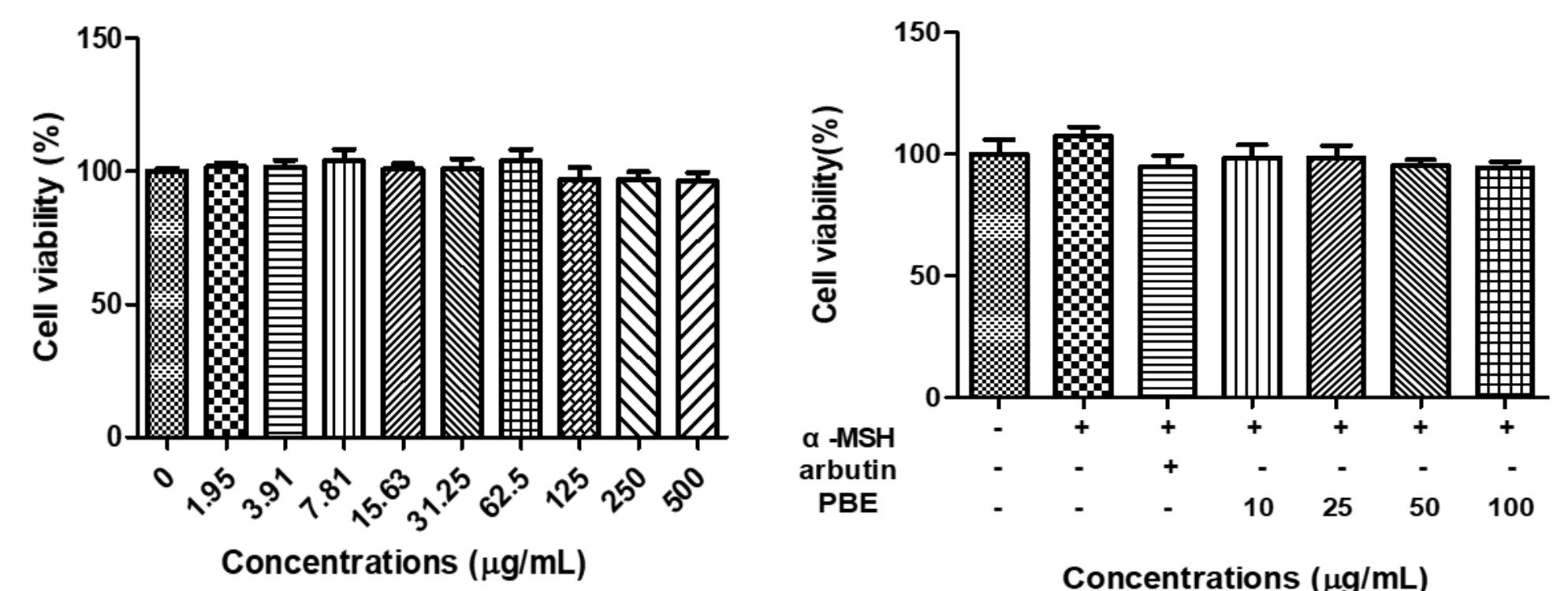


## METHODS

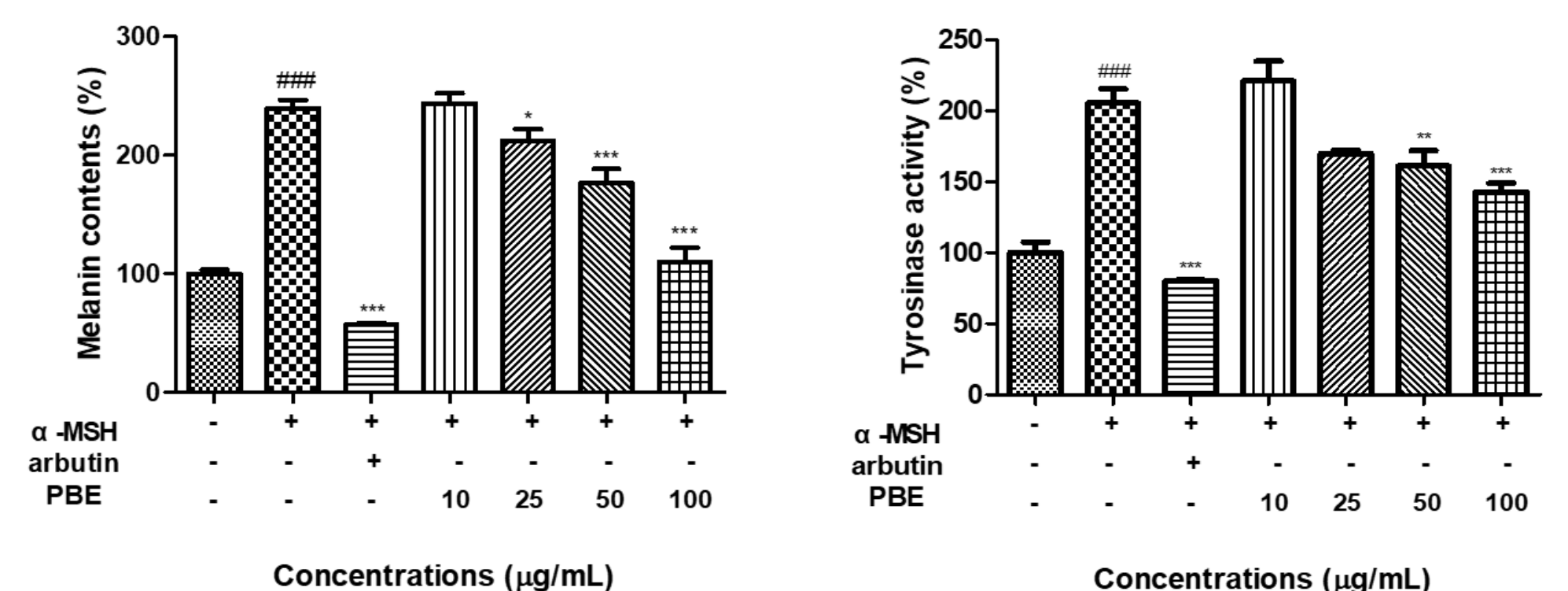


## RESULTS

### ▲ Effect of *P. bellardii* extract of B16F10 Cell Viability



### ▲ *P. bellardii* on anti-melanogenesis in B16F10 cell



- *P. bellardii* was extracted with 70% EtOH (PBE) and cell viability was demonstrated in B16F10 cells by MTT assay at concentrations of 1.95 - 500 µg/ml, and PBE did not show cytotoxicity at any concentration.
- These results indicate that the inhibitory effects of *P. bellardii* on melanin synthesis are likely linked to the suppression of tyrosinase expression, which plays a crucial role in reducing melanin production.

## PURPOSE

- In this study, an MTT assay was conducted on B16F10 melanoma cells treated with the 70% ethanol extract of *P. bellardii* for 72 hours to determine the optimal concentration
- Also, anti-melanogenic effects of *P. bellardii* extract were evaluated by examining tyrosinase activity and melanin content in B16F10 melanoma cells treated with the 70% ethanol extract of *P. bellardii* (PBE).

## CONCLUSION

- PBE showed a significant inhibition of melanin production and cellular tyrosinase activity
- PBE showed no cytotoxicity at any concentration. Furthermore, PBE demonstrated a dose-dependent reduction in melanin synthesis, suggesting its potential as a whitening agent.
- Additionally, these results suggest that PBE treatment may regulate the mechanism of melanin synthesis in B16F10 cells
- These results indicate that the inhibitory effects of *P. bellardii* on melanin synthesis are likely linked to the suppression of tyrosinase expression, a key enzyme in melanin production. This suggests that *P. bellardii* could serve as a promising candidate for the development of skin-whitening agents.