

# ANTIMICROBIAL AND ANTIOXIDANT SCREENING, SYNERGY STUDIES OF *HELICHRYSUM CHIONOPHILUM* EXTRACTS AGAINST TO RESISTANT MICROBIAL STRAINS

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## ABSTRACT

In this study, the antimicrobial activities and antioxidant properties of five different extracts of *Helichrysum chionophilum* plants from Gumushane/Turkey were investigated. To determine the antimicrobial activity disc diffusion and microdilution methods were used against to fifteen microorganisms. The effect of plant extracts and antibiotic combinations against to vancomycin-resistant *Enterococcus faecium* and methicillin-resistant *Staphylococcus aureus* were investigated as well. Total phenolic and flavonoid contents were determined by spectrophotometric techniques. Antioxidant properties of plant extracts evaluated by free radical scavenging assays which ABTS and DPPH. The plant ethyl acetate extract showed the highest level of total phenolic ( $423.01 \pm 0.8$  mg GAE/g extract) and flavonoid contents ( $100.18 \pm 1.4$  mg QE/g extract). Similarly, ethyl acetate extract exhibited the highest level of DPPH ( $IC_{50}$ :  $67.44 \pm 0.9$   $\mu$ g/ml). However, hexane extract exhibited the highest level activity of ABTS ( $IC_{50}$ :  $55.20 \pm 1.3$   $\mu$ g/ml). The highest MIC value was determined as 8  $\mu$ g/ml against to *Pseudomonas aeruginosa* on ethyl acetate extract. Besides, all of extracts exhibited antimicrobial activity on at least one test organism. Plant extracts with some antibiotic combinations generated synergies or partial synergic activity against to VREF and MRSA. These findings revealed that the plant has strong antimicrobial and antioxidant properties. Finally, using the plant extracts and antibiotic combinations might be a good tool in fighting with antibiotic resistance strains.

## KEYWORDS:

ABTS, antimicrobial activity, DPPH, medicinal plant, MIC, MBC, synergy

## INTRODUCTION

*Helichrysum*, belonging to the family Asteraceae, includes approximately 500 species, widespread around the world. This genus is represented in Turkish flora by 27 taxa, 15 of which are endemic and are widely found in Anatolia [1, 2, 3]. These species generally are known as “everlasting flower” around the world and “ölmez çiçek” or “altınotu” in Turkey [4, 5]. The *Helichrysum* species commonly used in folk medicine due to the anti-inflammatory [6], antioxidant [7, 8], insecticidal [9] and antimicrobial activity [10, 11] both in Turkey and some different places of the world. *Helichrysum chionophilum* is a one of the endemic plants which is belonging to the *Helichrysum* genus in Turkey. And this is using by people very commonly as a medicinal plant for some purposes such as a natural antimicrobial agent, tea and food.

Some bacterial mutations have caused the several kinds of antibiotic resistant bacterial strains that are now a threat to public health globally [12]. This problem has a crucial importance about peoples' health and it should be solved urgently. Today, the discovering to novel active compounds against to antibiotic resistant organisms or trying with different combinations of available ones has become the priority of fight to the resistant pathogens. In this case, medicinal plants have started to more popular. Already, these have been using by people for various purposes for a long time due to the having active phytochemicals.

Several researchers have documented that plants have exhibited antioxidant and antimicrobial properties [13, 14, 15, 16, 17, 18]. In particular, some of them exhibited an antibacterial activity of standard clinical strains [19]. On the other hand, [13] reported that some medicinal plants produced both bactericidal compounds and antibacterial resistance inhibitors. Although there are some different researches as mentioned, especially endemic plants which located in extreme conditions and high mountain area has not been tested pharmacologically yet. As already known that plants can accumulate hyper secondary metabolites for adapt to stress