



# Antibacterial Spectrum of Umckaloabo (Pelargonium Sidoides) On Upper Airway Infection Agents

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## ABSTRACT

**Aim:** In this study we aimed to search the antibacterial effect of the drugs with active ingredients of *Pelargonium sidoides* on different bacterial species isolated from the throat cultures of patients with upper airway infection.

**Methods:** Antibacterial activity on 72 *Streptococci*, 48 *Staphylococcus*, 32 *Neisseriae* spp, 20 *Moraxella catarrhalis*, and 20 *Haemophilus influenzae* was evaluated by using microdilution broth method.

**Results:** Antibacterial effect was detected on 8 *Neisseriae* spp, 4 *Haemophilus influenzae*, 4 *Streptococcus pneumoniae*, 4 *Staphylococcus epidermidis* and 4 *Moraxella catharralis* at 200 microgram and higher concentrations of the drug; but no meaningful antibacterial activity on other kinds of bacteria tested was observed

**Conclusion:** The scientific data with respect to antibacterial effect of *Pelargonium sidoides* are hopeful, but it is unadvisable to use this drug instead of antibiotic treatments.

**Key words:** *Pelargonium sidoides*, antibacterial activity, upper airway infection.

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## INTRODUCTION

Almost in all countries of the world, the plants which are believed to be important for health are being used for centuries. According to the research of World Health Organization (WHO) based on the literature of herbs and codexes of 91 different countries, the total amount of herbs is nearly 20.000 (1). In different laboratories of most countries, the antimicrobial effects of herbs have been searched since 1926 (2-6). Despite the improvement on medicine and technology at the present day, the widespread consumption of natural products and the economical crisis made herbs more effective and more purposive.

The drug, which is one of the best seller three drugs of Germany, rapidly increases the sales volume in last 2 years and contains "pelargonium sidoides" as active ingredient decreases the length of upper airway infection and flu, palliates the severity of symptoms by improving the immun system (7).

In classical textbooks, it can be seen that, the herb is antidiaretic and can also be used for airway diseases including tuberculosis (8). The herb has been derivated from the roots of a special plant of Zulu, Basuto, Xhosa and Mfengi clans of South Africa, called Umckaloabo. It is used for especially upper airway infections, chest pain and gastrointestinal infections in these clans (9). Also, it is shown that, it has anti-adhesive properties against *Helicobacter pylori* (10). The drug stops the disease at the onset by empowering the immun system and protecting the cells against viruses differently from other flu drugs (11). In vitro studies show that the drug has antibacterial and immunomodulator effects (12).

*Pelargonium sidoides* is thought to have antibacterial effects, especially against *Streptococcus*, *Staphylococcus* and *Bacillus cereus* (2). According to various studies, the antibacterial effect of the herb comes from its contents: coumarins and gallic acid. It is observed that, the minimal inhibitory concentration is 200-1000 µg/mL (13). Beside its antibacterial effect, it causes an increase of macrophage activity. Furthermore, it can improve the defense of the body because of the polychemical ingredients, vitamins and aminoacids present in its structure.

In this study, we aimed to investigate the antibacterial effect of the drug which is sold as gout form on markets, on different bacteria species isolated from

the throat cultures of patients with upper airway infection.

## MATERIALS and METHODS

In the study, we tested 192 different bacteria consisted of 72 *Streptococcus* spp. (32 *S. pneumoniae*, 20 *S. pyogenes*, 20 *S. viridans*), 48 *Staphylococcus* spp. (24 *S. aureus*, 24 *S. epidermidis*), 32 *Neisseriae* spp., 20 *Moraxella catarrhalis*, and 20 *Haemophilus influenzae* species. All of the isolates were obtained from the throat cultures of patients who had been referred to Ataturk University Medical Faculty Otolaryngology Department with upper airway infection symptoms.

Antibacterial effect and if any, Minimum Inhibitory Concentration (MIC) of the drug (UMCA® solution additives) against the test bacteria was determined using the modified microbroth dilution method described by Clinical and Laboratory Standards Institute (CLSI) (14,15). Suspensions equal to 0.5 McFarland turbidity ( $5 \times 10^5$  cfu/ml) were made from the test bacteria in sterile saline. On the other hand the drug was serially diluted in microplate wells beginning from the 1600 µg/ml to 200 µg/ml (1600 µg/ml, 800 µg/ml, 400 µg/ml, 200 µg/ml) using Mueller-Hinton broth, as the final volume in each well is 200 µl. Then 10 µl from the test bacterial suspension was added into the wells and mixed carefully. The plate was then incubated for 16-18 hours at 35°C. Following incubation, growth was observed visually. It was stated that the drug has an antibacterial effect if no growth was detected in the first or first and the following wells. In this case the concentration of the drug in last well with no growth was determined as Minimum Inhibitory Concentration (MIC) value. The drug was accepted as ineffective against relevant bacteria if there was growth in all the wells.

## RESULTS

Antibacterial effect was detected against 8 *Neisseriae* spp., 4 *Haemophilus influenzae*, 4 *Streptococcus pneumoniae*, 4 *Staphylococcus epidermidis* and 4 *Moraxella catarrhalis* species at concentrations of 200 µg/mL or higher levels (Table 1). No significant antibacterial effect was seen on the other bacterial species at all concentrations. MIC values of the drug differed between 200-1600 µg/mL. But it was 800 or 1600 µg/mL for most of the microorganisms (200 µg/mL for 3, 400 µg/mL for 3, 800 µg/mL for 8, and 1600 µg/mL for 10).

**Table 1.** Microorganisms against which antibacterial effect of *Pelargonium sidoides* was determined.

Microorganisms	Affected number of the strains (%)
<i>Neisseriae spp.</i> (n=32)	8 (25)
<i>Haemophilus influenzae</i> (n=20)	4 (20)
<i>Streptococcus pneumoniae</i> (n=32)	4 (12.5)
<i>Staphylococcus epidermidis</i> (n=24)	4 (16.7)
<i>Moraxella catharralis</i> (n=20)	4 (20)
<i>Streptococcus pyogenes</i> (20)	0 (0)
<i>Streptococcus viridans</i> (20)	0 (0)
<i>Staphylococcus aureus</i> (24)	0 (0)

## DISCUSSION

Pelargonium is a plant that African Zulu clan uses for thousand years as a herb. Although its homeland is South Africa, it is also known in our country and grown as Sardunya (geranium). Its name in Africa is Umckaloabo, and means "usefull for deep cough" in Turkish.

Umckaloabo has a strong immunomodulator effect. It stimulates the macrophages and natural killer cells of the immun system and increases the production of the cytokines, interferon and tumor necrosis factor (16). Also, it helps the excretion of secretions accumulated in airway (17).

It is reported that, Pelargonium sidoide extracts have antibacterial effect against *Staphylococcus aureus*, *Streptococcus pneumoniae*, beta-hemolytic streptococcus, *Escherichia coli*, *Klebsiella pneumoniae*, *Proteus mirabilis*, *Pseudomonas aeruginosa* and *Haemophilus influenzae* species (12). Thus, we considered that it would be useful for decreasing the treatment lenght and reducing the symptoms of the disease in Ear-Nose-Throat departments frequent illnesses, tonsillitis and rhino-sinusitis. (18,19).

In this in vitro study we found limited antibacterial effect in the drug containing pelorgonium sidoides against microorganisms isolated from the patients who applied to our department with symptoms of upper airway infection. The drug was effective on only the 24 of the tested 172 microorganism (14%). The drug was more effective against gram negative bacteria than gram positive. Also the MIC values were rather high.

In a previous study conducted on 143 children with non-A beta-haemolytic streptococcus tonsillo-pharen-gitis, it was shown that pelargonium sidoides had better results than placebo, and it reduced the symptoms and shortened the lenght of illness at least for 2 days (20).

Similarly, in a placebo-controlled study with 468 adult who had acute bronchitis diagnosis, pelargonium sidoides had better results than placebo and shortened the time for turning back to work for at least 2 days (8).

Additionally, it was reported that topical use of pelargonium sidoides had antiviral effect against labial and genital herpes infections caused by Herpes simplex I and Herpes simplex II viruses and antibacterial effect against skin infections caused by methicillin-resistant *Staphylococcus aureus* (12). The drug has antibacterial effect at high concentrations but it has different results at different species of same kind. So, more in vivo and in vitro studies must be done to determine its efficacy.

The scientific datas with respect to antibacterial effect of pelargonium sidoides are hopeful, but it is not true to use Pelargonium instead of antibiotic treatments.

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