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### ANTIBACTERIAL EFFECTS OF MEDICINAL PLANTS USED IN TRADITIONAL MEDICINE ON ORAL MICROFLORA AND THE CLINICAL EFFECTIVENESS OF COMPREHENSIVE HYGIENIC MEASURES

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**Abstract:** *This thesis analyzes the in vitro and in vivo effects of chamomile (*Matricaria chamomilla*), sage (*Salvia officinalis*), plantain (*Plantago major*), and echinacea (*Echinacea purpurea*) on major pathogenic microorganisms of the oral cavity, as well as the effectiveness of their combined use with traditional hygienic measures. The study aims to investigate the minimum inhibitory concentrations (MIC) of plant extracts and their impact on clinical oral hygiene indicators.*

**Keywords:** *medicinal plants, chamomile, sage, plantain, echinacea, antibacterial effect, MIC, oral microflora, phytotherapy, clinical effectiveness.*

#### **Introduction and Relevance**

In the context of the growing problem of antimicrobial resistance (AMR), scientific interest in plant-based therapeutic agents is steadily increasing. According to the World Health Organization report of 2019, antimicrobial resistance could cause up to 10 million deaths annually by 2050.

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Under these circumstances, the use of phytotherapeutic agents in dental prevention has become highly relevant as an alternative strategy.

In Uzbekistan, chamomile, sage, and plantain have been used for centuries in the treatment of oral diseases. However, this traditional knowledge is often based on empirical experience and requires scientific validation. Modern phytopharmacological methods provide an opportunity to fill this gap.

#### Materials and Methods

During the *in vitro* stage, aqueous and ethanolic extracts of four plants will be prepared in ratios of 1:10, 1:20, and 1:50. Antibacterial activity against *Streptococcus mutans* ATCC 25175, *Porphyromonas gingivalis* ATCC 33277, *Fusobacterium nucleatum* ATCC 25586, *Candida albicans* ATCC 10231, and *Staphylococcus aureus* ATCC 25923 strains will be determined using the disk diffusion (Kirby-Bauer) method and MIC determination techniques.

During the *in vivo* (clinical) stage, 30 patients diagnosed with gingivitis will be randomly assigned into two groups:

- **Main group (n=15):** standard oral hygiene + plant-based mouth rinse (chamomile + sage combination, 1% concentration);
- **Control group (n=15):** standard oral hygiene + 0.12% chlorhexidine.

Differences in PI, GI (Loe-Silness Gingival Index), and PBI (Papilla Bleeding Index) will be assessed over a 6-week observation period.

#### Expected Results and Significance

The *in vitro* experiment is expected to show that the chamomile + sage extract combination will demonstrate MIC values of 0.5–1.0 mg/ml against *Streptococcus mutans* and 0.25–0.5 mg/ml against *Porphyromonas gingivalis*. These findings are anticipated to confirm clinically significant antibacterial activity.

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The immunomodulatory effect of echinacea extract is expected to manifest through reduced levels of inflammatory mediators IL-6 and TNF- $\alpha$ .

At the clinical stage, the plant-based preparation is expected to demonstrate effectiveness statistically comparable to chlorhexidine ( $p>0.05$ ), while causing fewer side effects such as tooth staining and taste disturbances. This result would scientifically support the proposal of plant-based agents as a worthy alternative to chlorhexidine.

Based on the study results, a methodological guideline for oral hygiene adapted to national conditions and based on medicinal plants grown in Uzbekistan will be developed. This guideline will enable cost-effective primary prevention of oral diseases using affordable local resources.

#### MAIN REFERENCES

1. Burt S. (2004). *Essential oils: their antibacterial properties and potential applications in foods*. International Journal of Food Microbiology, 94(3), 223–253.
2. Cowan M.M. (1999). *Plant products as antimicrobial agents*. Clinical Microbiology Reviews, 12(4), 564–582.
3. Moreira M.R. et al. (2009). *Inhibitory parameters of essential oils to reduce a foodborne pathogen*. LWT — Food Science and Technology, 39(4), 294–300.
4. Pereira R.S. et al. (2011). *Antibacterial activity of essential oils on microorganisms isolated from urinary tract infection*. Revista de Saúde Pública, 38(2), 326–328.
5. Sofrata A. et al. (2011). *Benzyl isothiocyanate from Salvadora persica roots is active against periodontal pathogens*. BMC Complementary Medicine, 11, 75.
6. WHO. (2019). *Antimicrobial Resistance: Global Report on Surveillance*. Geneva: WHO.