

UDC: 615.32:615.451.16:615.28

EXPERIMENTAL SUBSTANTIATION OF HERB MATERIAL SELECTION IN THE MAKING OF COMPLEX TINCTURE FOR PERIODONTICS

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Among dental diseases the inflammation of parodontium – gingivitis and periodontitis – remain one of the most widespread pathologies (~90%). The prophylaxis and treatment of these diseases are not only a medical problem, but also a social one. It is possible to enhance the efficacy of treatment of parodontium tissues lesions by creating new therapeutic agents [1, 11].

The leading role of microorganisms, their associations and toxins that they produce in course of parodontium inflammation initiation and development is proven by multiple researches. It is also shown that they are the most frequent etiologic factors of this type of pathology. Therefore the main target of parodontium diseases therapy is the elimination of the detrimental effects caused by on the surrounding tissues and of the agents themselves with the help of antimicrobial agents, namely antibiotics and antiseptics [1].

Microbiological analysis of species composition of the parodontium soft tissues in patients with periodontitis has established the prevalence of aerobic-anaerobic microflora. Also the absence of universal antibiotic agent that could be active towards all determined groups of microorganisms was highlighted [2].

It is also important to take into account that the natural biological response of the microorganisms on the application of antimicrobial therapeutical agents is the emergence of the resistant form of the pathogens, as well as the high probability of oral cavity dysbiosis development. It is possible to elude the above mentioned side effects by using phytochemical preparations and medicinal herbs prescribed for the treatment of many different diseases, dental pathologies being among them [3].

The widespread application of phytotherapy is promoted further by several substantial advantages: mild pharmacological activity; multifactorial effect of the biologically active compounds along with their low toxicity, safety, availability, the possibility of their long-term application according to specific prescription. The mentioned above factors are a precondition for creating new phytoagents for therapeutical stomatology as well as the search for certain species of herb raw material as the potential research targets [5, 7, 9].

In course of a phytotherapeutical agent development the selection of herb raw materials (HRM) is frequently carried out empirically, being influenced by literature sources and folk traditions. In order to develop a complex tincture with an anti-inflammatory, wound-healing and antimicrobial activity an experimental substantiation of HRW selection for stomatological therapeutical agent with the help of microbiological screening is discussed in the present work.

Materials and methods

After information sources analysis the following HRM were chosen as the potential targets: licorice roots –

radices Glycyrrhizae (Common licorice – *Glycyrrhiza glabra* L., fam. Fabaceae), sedge rootstocks – rhizomata Calami (sedge cane – *Acorus calamus* L., fam. Araceae), rootstocks and roots of burnet – rhizomata et radices Sanguisorbae (greater burnet – *Sanguisorba officinalis* L., fam. Rosaceae). These plants are usually chosen by patients with dental diseases for extemporal medicine preparation.

The mentioned above herbs contain different chemical compounds that stipulate their biological activity and application in medicine [4, 6, 8, 10, 12].

The quality of the HRM chosen for the tests was confirmed beforehand.

We considered that the primary task in construction of a phytopreparation in a form of a complex tincture for multifactorial influence on different links of pathological process in treatment of parodontium diseases was to establish the antimicrobial activity of separate tinctures prepared from the every research sample.

In connection therewith, herb tinctures with 40% ethanol were prepared from the studied raw materials with the help of maceration method according to the standard technology. For determination of the influence of biologically active compounds concentrations the research samples were prepared in proportions 1:5 and 1:10 (raw material:extractant). The solvent – 40% ethanol and herb preparation “Stomatophyt” (“Phytopharm Klenka S.A.”, Poland) were used as controls.

According to WHO recommendations, the evaluation of antibacterial activity of the tinctures samples was carried on test strains of typical American culture collection: *S. aureus* ATCC 25923, *S. pneumoniae* ATCC 49619, *E. coli* ATCC 25922, *P. aeruginosa* ATCC 27853, *C. albicans* ATCC 885-653, as well as clinical strains of *S. epidermidis*, *S. mitis*, *Corynebacterium* spp., that were obtained from periodontal pockets of the patients.

The commonly accepted method of diffusion into agar (“well” method) was applied. The evaluation of the activity between research samples, control solvent and preparation of comparison was held according to the order № 167 of Ministry of Health of Ukraine issued on 05.04.2007.

Results and discussion

The evaluation of antimicrobial and antifungal activity of research samples (tinctures of licorice roots, sedge cane rootstocks, burnet rootstocks and roots) as well as the activity of the solvent (40% ethanol) towards the museum strains was performed by measuring with the ruler the size of the zones of microorganisms and fungi growth cessation near the wells containing the specific research sample (in mm).

The obtained data concerning the diameters of the growth cessation zones around the “wells” are presented in figure 1-3.

The analysis of the obtained data (fig.1-3) has shown that among all research samples the tincture of burnet rootstocks and roots was characterized by a high antimicrobial activity towards the museum strains.

The present research has confirmed that the solvent – 40% ethanol does not influence the antimicrobial activity of the liquid medicinal agent.

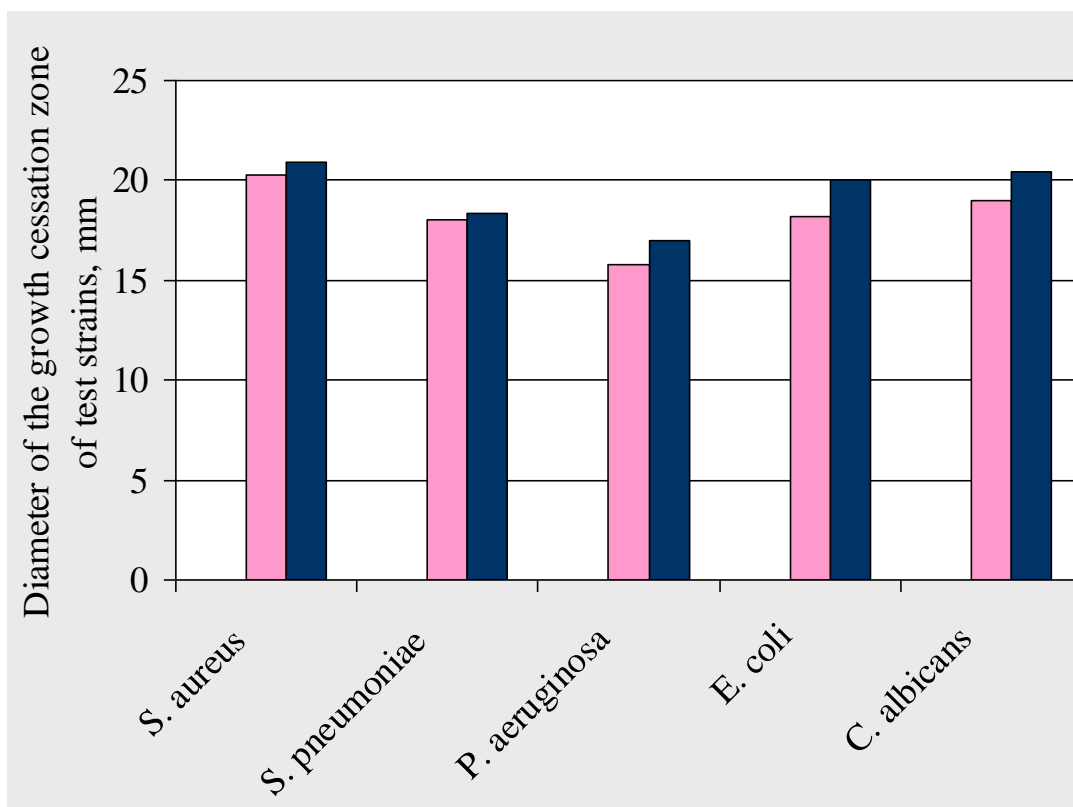


Fig. 1 – Antimicrobial and antifungal activity of the Burnet rootstocks and roots tincture towards the museum strains of microorganisms and fungi:

research samples tincture (1:5); research samples tincture (1:10).

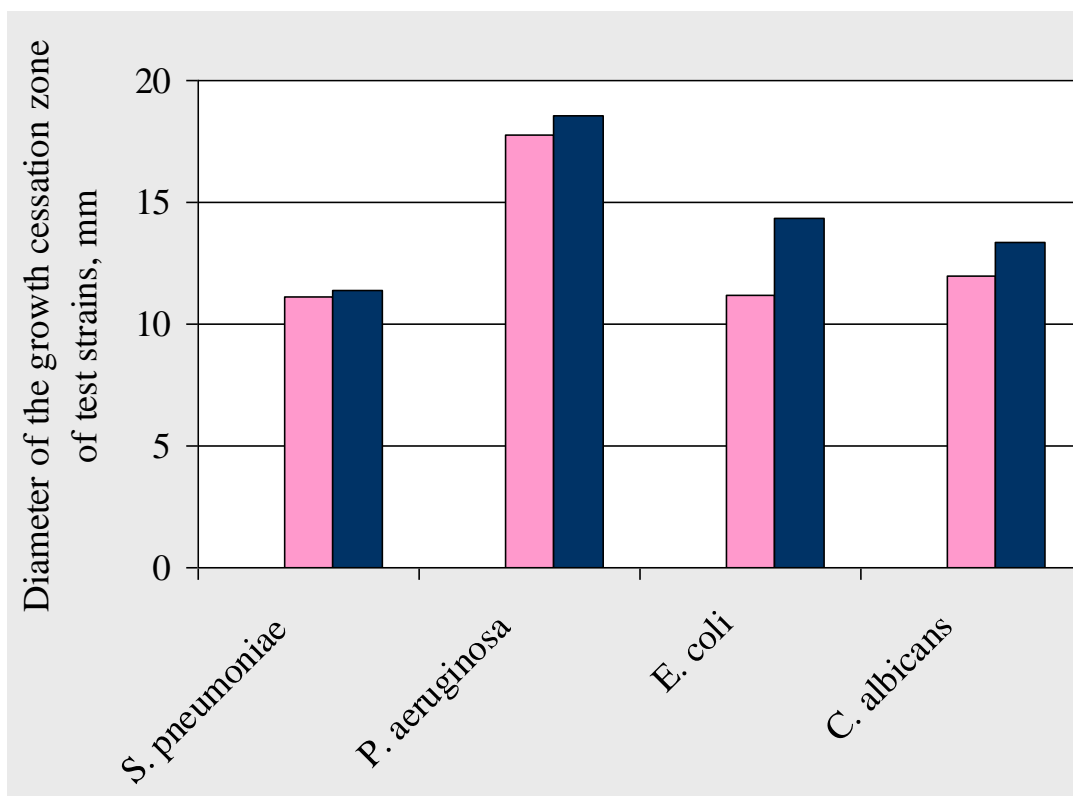


Fig. 2 – Antimicrobial and antifungal activity of the Sedgeane rootstocks tincture towards the museum strains of microorganisms and fungi:

research samples tincture (1:5); research samples tincture (1:10).

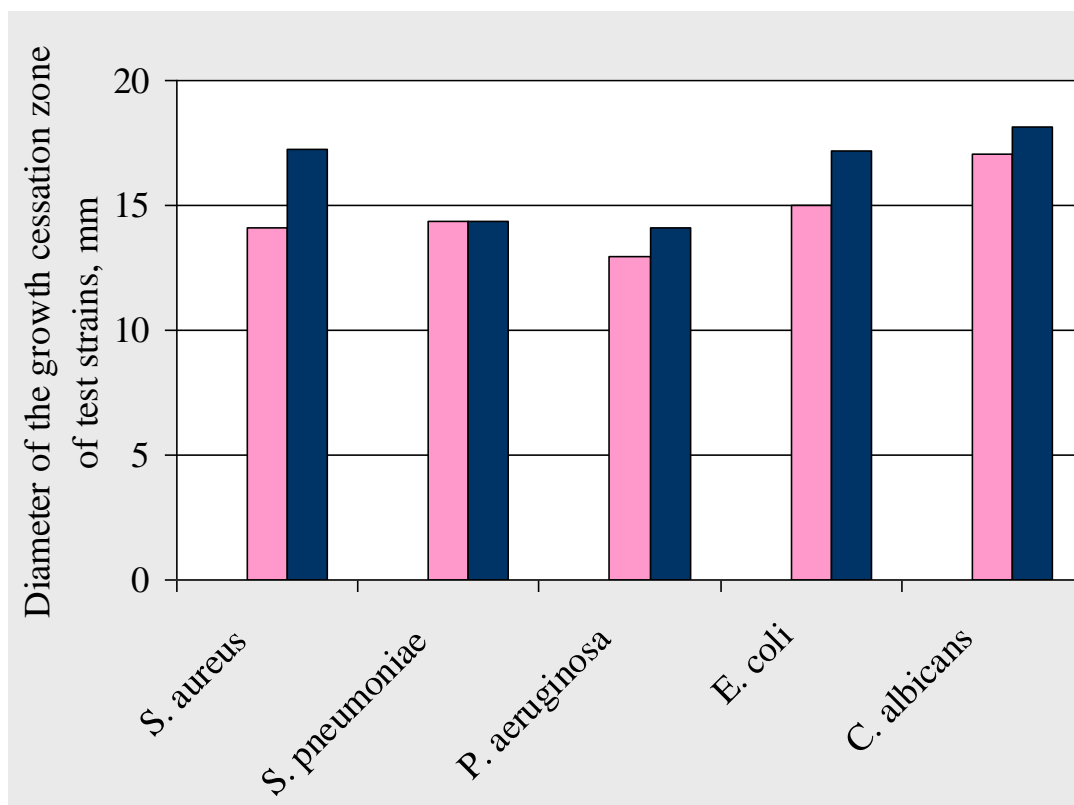
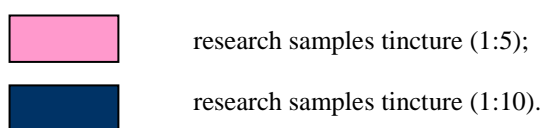


Fig. 3 – Antimicrobial and antifungal activity of the Licorice roots tincture towards the museum strains of microorganisms and fungi:



The results of comparison of antimicrobial and antifungal activity between the research preparations and medicinal agent “Stomatophyt” towards the clinical strains are shown in the table 1.

According to the data obtained during the microbiological screening (table 1) it was established that the studied tinctures of licorice roots and burnet rootstocks and roots

reveal more pronounced antimicrobial activity compared to stomatological preparation “Stomatophyt”, that was characterized by significantly lower level of activity towards *S. epidermidis*, *S. mitis*, *Corynebacterium spp.* compared to the studied tinctures.

Table 1- Antimicrobial activity of the research samples towards the clinical microorganisms strains

Research samples	Diameter of the growth cessation zone of microorganisms clinical strains (M±m), mm		
	<i>S. epidermidis</i>	<i>S. mitis</i>	<i>Corynebacterium spp.</i>
Burnet rootstocks and roots tincture (1:5)	14,17±0,22	17,25±0,33	17,18±0,41
Burnet rootstocks and roots tincture (1:10)	19,15±0,24	18,00±0,48	15,13±0,27
Sedge cane rootstocks tincture (1:5)	11,45±0,19	–	–
Sedge cane rootstocks tincture (1:10)	11,48±0,21	–	–
Licorice roots tincture (1:5)	12,18±0,19	–	14,17±0,30
Licorice roots tincture (1:10)	10,87±0,18	–	19,15±0,35
«Stomatophyt»	12,03±0,27	13,48±0,33	14,10±0,37

Note: n = 6; « – » - absence of the growth cessation zone

The comparison of the growth cessation zones of microorganisms and fungi between the research samples (fig. 1-3, table 1) has established that the antimicrobial and antifungal activity of the tinctures with the ratio 1:10 was not inferior to the activity of tinctures with the ratio 1:5. Therefore, it is appropriate to select a ratio of raw material:extractant equal to the 1:10 for creation of the liquid medicinal preparation.

Conclusion

The adequacy of the licorice roots and sedge cane rootstocks and burnet roots and rootstocks as potential objects for creating a phytotherapeutical agent for treatment of inflammatory parodontium diseases was established with the help of microbiological screening.

It was proven that the optimal ratio raw material:extractant (according to the established antimicrobial activity level) is 1:10 and that this ratio is suitable for application in further experiments devoted to the stomatological therapeutical agent composition development.

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УДК: 615.32:615.451.16:615.28

ЕКСПЕРИМЕНТАЛЬНЕ ОБҐРУНТУВАННЯ ВИБОРУ ЛІКАРСЬКОЇ РОСЛИННОЇ СИРОВИНИ ПРИ СТВОРЕННІ КОМПЛЕКСНОЇ НАСТОЙКИ ДЛЯ ПАРОДОНТОЛОГІЇ

Шульга Л.І., Бірюкова С.В., Пімінов О.Ф.

У даній роботі експериментально обґрунтована придатність застосування коренів солодки, кореневищ айру, кореневищ та коренів родовика у якості компонентів складу комплексної настоянки для лікування запалень пародонту та доведено оптимальне співвідношення сировина екстрагент на підставі отриманих результатів мікробіологічних досліджень.

Ключові слова: лікарська рослинна сировина, настоянка, антимікробна активність.

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ЭКСПЕРИМЕНТАЛЬНОЕ ОБОСНОВАНИЕ ВЫБОРА ЛЕКАРСТВЕННОГО РАСТИТЕЛЬНОГО СЫРЬЯ ПРИ СОЗДАНИИ СЛОЖНОЙ НАСТОЙКИ ДЛЯ ПАРОДОНТОЛОГИИ

Шульга Л.И., Бирюкова С.В., Пиминов А.Ф.

В данной работе экспериментально обоснована возможность использования корней солодки, кореневищ айра, кореневищ с корнями кровохлебки в качестве компонентов состава сложной настоянки для лечения воспалений пародонта и доказано оптимальное соотношение сырья экстрагент на основании полученных результатов микробиологических исследований.

Ключевые слова: лекарственное растительное сырье, настоянка, антимикробная активность.

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During this work, possibility of using of licorice roots, sedge cane rootstocks as well as burnet rootstocks with its roots as components of a complex tincture for periodontitis treatment was experimentally substantiated, and an optimal raw material-extractant ratio, based on results of microbiological studies, was proved.

Key words: medicinal plant raw materials, tincture, antimicrobial activity.