**CURRENT APPROACHES TO THE MULTI-VECTOR SEARCH OF PERSPECTIVE PLANT OBJECTS FOR NEW MEDICINES**

**O.F. Piminov, L.I. Shulga, T.S. Beztsenna**

Institute of Pharmacy Professionals Qualification Improvement of National University of Pharmacy

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The work is devoted to possible approaches concerning the search of promising plant objects for creating new medicines and their use by the example of herbal collections for dental practice. 110 prescriptions of folk and traditional medicine used for the treatment of inflammatory diseases of parodontium and the mucous membrane of the oral cavity have been chosen and analyzed. The belonging of herbal components of the collections studied to the families of Asteraceae (16.39%), Rosaceae (11.48%), Lamiaceae (9.02%), and Apiaceae (6.56%) has been determined. The number of herbal compositions in prescriptions has been calculated and according to the results the dominance of the group with 4-6 ingredients has been revealed. Analyzing the plants in prescriptions according to the type of the raw material it has been found that in compositions of herbal collections the overground parts, such as herbs (30.15%) and leaves (17.65%), are dominant types of the raw material. In collections studied according to the rating of usage the most frequently used plants are garden sage, wild chamomile, oak, calendula, St. John’s wort, sedge, stinging nettle, thyme, common yarrow, common origanum, wild rose. For the indicated list of medicinal plants stable combinations with other species of plants represented schematically have been grouped. The ways of conducting the research together with the data obtained concerning the search of promising plants that can be used for scientific evidence of the compositions of multicomponent medicines based on the medicinal plant raw material intended for drug therapy of a number of pathological conditions, particularly inflammatory stomatological diseases, have been outlined.

Centuries-long experience in application of phytotherapy and phytomedicines in different fields of medicine demonstrates the expediency of creation of new medicines based on the medicinal plant raw material (MPRM) [6, 7]. Herbal drugs also take a leading position in the complex treatment of inflammatory dental diseases. Plant-based medicines are represented by different dosage forms both as mono- and multicomponent medicines for local application and more rarely for internal use. A separate MPRM and herbal collections used to prepare aqueous and water-alcoholic extracts were included into dental practice a long time ago and into the treatment regimens of diseases of the oral cavity [1, 2].

Development of the composition of complex herbal medicines implies multi-vector approaches because it is necessary to take into consideration a number of factors: pathogenesis of diseases, the content of biologically active substances in medicinal plants, combination of components, etc. [4, 5, 8].

The aim of the research is to determine possible approaches to the search of a promising MPRM and its further application while creating herbal collections, particularly for dental practice. To achieve this goal it is necessary to consider the information sources concerning phytotherapy in dentistry, to choose collections of MPRM, to analyze the combinations of herbs selected by the number of ingredients, to distribute them according to the type of the raw material, to determine the most widespread medicinal plants and their combinations with other plants in the composition of the collections studied.

**Materials and Methods**

As the objects of the research the collections of medicinal plants, as well as the initial plant raw material of their composition, which folk and traditional medicine offer for the treatment of inflammatory diseases of parodontium (IDP) and the mucous membrane of the oral cavity (MMOC) were chosen. The data of information sources (encyclopedias, reference books, internet resources) were the subject of the analysis [1-3, 9-11]. During the research we were guided by the methods of modern information retrieval, the systematic and comparative analysis and the generalization method.

**Results and Discussion**

Having considered the information sources selected we have separated 110 herbal collections that are used for drug therapy of IDP and MMOC. It has been determined that 122 medicinal plants belonging to 48 different families are found in these prescriptions. It has been found that the most widespread families of the components of the phytocompositions studied are Asteraceae consisting of 20 species of plants (16.39%), Rosaceae with 14 representatives (11.48%), Lamiaceae – 11 (9.02%), Apiaceae – 8 (6.56%). Three families such as Ericaceae, Fabaceae, Polygonaceae were represented.
by equally a smaller number of plants (6 types in each, representing 4.92%).

The collections of herbs selected differed significantly by the number of ingredients. The collections studied were distributed by the number of components given in Table 1.

According to Table 1 it has been noted that more than a quarter of the total number of the collections analyzed consisted of four components. The prescriptions that contained 2, 3, 5 and 6 plants accounted for a smaller proportion (13.64–20.00%). The smallest proportion (up to 5%) included collections containing more than 6 ingredients.

The herbal compositions selected were divided according to the type of the raw material represented in Table 2.

Besides pharmacopoeial species of MPRM (flowers, herbs, leaves, branches, fruits, seeds, roots, rhizomes, rhizomes and roots, cones, etc.), it has been noted the presence of other species of the plant raw material (petals, fruit peel, branches with leaves, etc.) in this dosage form. Due to the fact that the sources of folk medicine were also analyzed and in some plants several types of the raw material were used, the total number of plants and the raw material varied (for example, leaves, flowers, roots were typical for stinging nettle in prescriptions). The group “Others” included both pharmacopoeial types of MPRM and nonpharmacopoeial plants occurring singly; on the whole it was 10.29%.

As shown in Table 2, in the prescriptions herbs were used most frequently (30.15%), leaves were used almost twice less (17.65%). Underground parts were used much less frequently than overground parts: roots – 12.50%, rhizomes – 2.94%, roots and rhizomes – 1.47%.

The next stage of the research was to determine the most commonly used MPRM-components of the collections and their combinations with other herbs in the prescription. There were 122 MPRM-components analyzed with determination of the frequency of occurrence, and only 11 medicinal plants were selected for the consideration. They can be seen in Fig. 1 together with the percentage of frequency of usage. The objects that are mentioned rarely or do not have the repeatability in combinations are not shown in Fig. 1.

The most frequently used plants were conditionally divided into 3 groups. The first group (in more than 15% of collections) comprised oak, calendula, wild chamomile, garden sage; the second group (the proportion was in the range of 10–15%) included St. John’s wort, sedge, thyme, stinging nettle; the third group (less than 10%) was composed of origanum, yarrow, wild rose.

Since it has been found that collections more commonly consist of 4-6 ingredients, we have selected 11 medicinal plants that are the most frequently used. It is rational for them to determine stable combinations with other plants and take into consideration the theoretical substantiation of the components of the collection while developing its composition.

The combination of medicinal plants of conditional groups 1-3 with other species indicated in the prescriptions studied is represented in Fig. 2-4.
According to the results shown in Fig. 2, it was found that garden sage was most frequently combined in collections with calendula (9.09%), oak (7.27%), and with St. John's wort, wild chamomile (5.45% each). Prescriptions of garden sage with the raw material of sedge (4.55%), yarrow, stinging nettle, thyme (3.64% each) were less commonly used.

Combinations of wild chamomile with calendula were identified in 10.00% of the collections, it was combined with garden sage and oak almost twice more seldom (5.45% each). It has been determined that the raw material of wild chamomile can also be combined with southern sumac, woundwort, licorice, plantain, bur-marigold, bitterling.

Similar combinations were also observed for oak. The raw material of the plant was most frequently mentioned with garden sage, more rarely with thyme and wild chamomile (4.55% each), St. John's wort and sumac (3.64% each), with the raw material of walnut, yarrow, licorice, linden, origanum (2.73% each).

For calendula, besides the above mentioned combination with wild chamomile and garden sage, there were combinations with yarrow, St. John's wort, bur-marigold and others.

Analyzing the schemes of Fig. 3 it was noted that medicinal plants of the second group were often used in compositions with the objects
of the first group. For instance, St. John’s wort was more frequently combined with garden sage (5.45%) and oak (3.64%), more rarely with calendula, wild chamomile (2.73% each). The least frequent (1.82%) was the combination of the herb with elderberry, yarrow, sedge and others.

Wide-spread combinations for thyme were those with oak (4.55%), garden sage and walnut (3.64% each), more rarely with origanum, calendula (2.73%) and St. John’s wort, stinging nettle (1.82% each).

For sedge the most frequently used combinations were those with garden sage and wild chamomile (3.64%), with dog-bean, St. John’s wort, calendula, stinging nettle and others (1.82% each).

Stinging nettle in 3.64% of prescriptions was combined with garden sage and only in 1.82% of prescriptions there were combinations with oak, yarrow, wild chamomile, calendula, etc.

According to Fig. 4, it was determined that common origanum was most frequently combined with althaea, balm (3.64% each). The most widespread (3.64%) for yarrow was its use with oak, wild chamomile and garden sage. Wild rose in 2.73% was combined with rowan, stinging nettle, black currant.
CONCLUSIONS
1. 110 herbal collections of folk and traditional medicine have been analyzed. It has been determined that the prescriptions containing plants of Asteraceae and Rosaceae families are recommended for the treatment of dental diseases; they consist of 4-6 ingredients, but the dominant types of the raw material are the overground parts such as herbs (30.15%) and leaves (17.65%).

2. It has been found in the composition of collections the most frequently used plants are garden sage (28.18%), wild chamomile (24.55%), oak (19.09%), calendula (19.09%), St. John’s wort (12.73%), sedge (12.73%), stinging nettle (11.82%), thyme (10.00%), common yarrow (9.09%), common origanum (9.09%), wild rose (9.09%), for which stable combinations of plant components are represented in a collection with them.

3. The approaches to the search of promising plants that can be used for scientific evidence of the composition of phytomedicines, among which there are collections for dental practice, have been outlined.

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СОВРЕМЕННЫЕ ПОДХОДЫ К МУЛЬТИВЕКТОРНОМУ ПОИСКУ ПЕРСПЕКТИВНЫХ РАСТИТЕЛЬНЫХ ОБЪЕКТОВ ДЛЯ НОВЫХ ЛЕКАРСТВЕННЫХ СРЕДСТВ

А.Ф.Пиминов, Л.И.Шульга, Т.С.Безценная

Институт повышения квалификации специалистов фармации Национального фармацевтического университета

Ключевые слова: методология; фитопрепараты; разработка состава; лекарственное растительное сырье

Представленная работа посвящена отображению возможных подходов к поиску перспективных растительных объектов для создания новых лекарственных средств растительного происхождения и их реализации на примере сборов для стоматологической практики. Из источников народной и официальной медицины отобраны и проанализированы 110 прописей, используемых в лечении воспалительных заболеваний пародонта и слизистой оболочки полости рта. Установлена принадлежность растительных компонентов исследуемых сборов к семействам Астровые (16,39%), Розовые (11,48%), Яснотковые (9,02%), Сельдерейные (6,56%). Рассчитана числа растительных составляющих в прописях и по результатам подсчетов выявлено преобладание группы с количеством ингредиентов 4-6. При рассмотрении растений в композициях относительно вида сырья отмечено, что в составе сборов чаще прописаны надземные части (трава – 30,15%, листва – 17,65%). В исследуемых сборах по рейтингу применяемости определены 11 наиболее распространенных ингредиентов: шалфей лекарственный, ромашка лекарственная, дуб обыкновенный, календула лекарственная, зверобой продырявленный, аир обыкновенный, крапива двудомная, тимьян обыкновенный, тысячелистник обыкновенный, душица обыкновенная, крапива двудомная. Для установленного перечня лекарственных растений сгруппированы постоянные сочетания с другими растительными компонентами в пределах одного сбора, которые представлены схематично. Указанные пути проведения исследований совместно с полученными данными по поиску перспективных растений могут быть использованы для научного обоснования составов многокомпонентных лекарственных препаратов на основе лекарственного растительного сырья, предназначенных для фармакотерапии ряда патологических состояний, в частности воспалительных стоматологических болезней.

Address for correspondence: 17, Vosstaniya square, Kharkov, 61001, Ukraine.
Tel. (57) 732-27-98. E-mail: ipksf@ukr.net.

Institute of Pharmacy Professionals Qualification Improvement of National University of Pharmacy

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