

Barbara Kubik<sup>1,2</sup>, Alina Stachurska-Swakoń<sup>3\*</sup>

<sup>1</sup>Institute of Biology, Pedagogical University of Krakow, Podchorążych 2 St., 30-084 Kraków, Poland

<sup>2</sup>CenterMed Hospital Św. Łazarza, Św. Łazarza 14 St., 31-530 Kraków, Poland

<sup>3</sup>Jagiellonian University, Gronostajowa 3 St., 30-387 Kraków, Poland; \*alina.stachurska-swakon@uj.edu.pl

## Plants supporting the treatment of cardiovascular diseases

### Introduction

Cardiovascular diseases have always accompanied human, however nowadays they occur much more often due to an intense lifestyle, daily dose of stress, excessive alcohol consumption, smoking, sedentary work combined with physical inactivity, environmental pollution, poor diet dominated by high-fat products and many other external factors. That is why it is so important not to ignore the first symptoms of cardiovascular disorders, such as: palpitations, excessive fatigue or breathlessness. Symptoms of this type should stimulate specialist examinations and undertake appropriate treatment or prophylaxis (Beaglehole et al., 2001; Noskowicz-Bieroniowa, 2006; Górnicka, 2012; Wojtyniak et al., 2013; Senderski, 2016; Liperoti et al., 2017). Ignoring the first symptoms of abnormal heart function and vascular insufficiency leads to a gradual intensification of these ailments. It can be directly life-threatening in the later stages of the disease (Sroka, 1988; Palmieri et al., 2018).

Despite the ongoing preventive measures, diseases from this group are recognised as the leading cause of death globally. In 2019, an estimated 17.9 million people died from cardiovascular diseases, which was responsible for 32% of all global deaths (*www.who.int*). The number of deaths unfortunately is increasing across the years: in 2002, 16.7 million people died of this cause, including 6.9 million from coronary heart disease and 5.1 million from stroke (Matyjaszczyk et al., 2011). Statistics show that across Europe more women than men die from heart-related diseases. Cardiovascular diseases are classified as civilisation diseases, which are currently one of the biggest health problems in highly developed and developing countries. Among the civilisation diseases of the circulatory system, the most frequently mentioned are: hypertension, low blood pressure, coronary heart disease, atherosclerosis and myocardial infarction (Matyjaszczyk et al., 2011; Lewkowicz-Mosiej, 2017). For example, inadequately treated or

untreated high blood pressure can disrupt a variety of organs including the kidneys, brain, heart, and arteries, which can lead to haemorrhage, paralysis, and even death (Noskowicz-Bieronowa, 2006; Górnicka, 2012). With atherosclerotic lesions, fatty and calcium deposits are deposited in the lumen of the blood vessels, which in turn results in narrowing, thickening or loss of elasticity of the vessels. The consequence of this type of changes are anal varices (haemorrhoids), shins or purpura (Ożarowski, Jaroniewski, 1987; Noskowicz-Bieronowa, 2006).

The causes of cardiovascular diseases can be different, therefore many groups of medicines are used to treat them. The treatment strategy is based on the use of medicines that lower blood pressure, regulate the heart rhythm or have an antiarrhythmic effect. In recent years, herbal preparations are being used more and more often because their side effects are usually less burdensome for the patient. At the same time, the use of plant-based medicines, especially those containing cardiac glycosides, cannot take place without medical supervision, because these raw materials are not indifferent to human health and life (Capasso et al., 2000; Nowak, 2009; Kohlmünzer, 2010; Liperoti et al., 2017; Länger et al., 2018; Bejček et al., 2021).

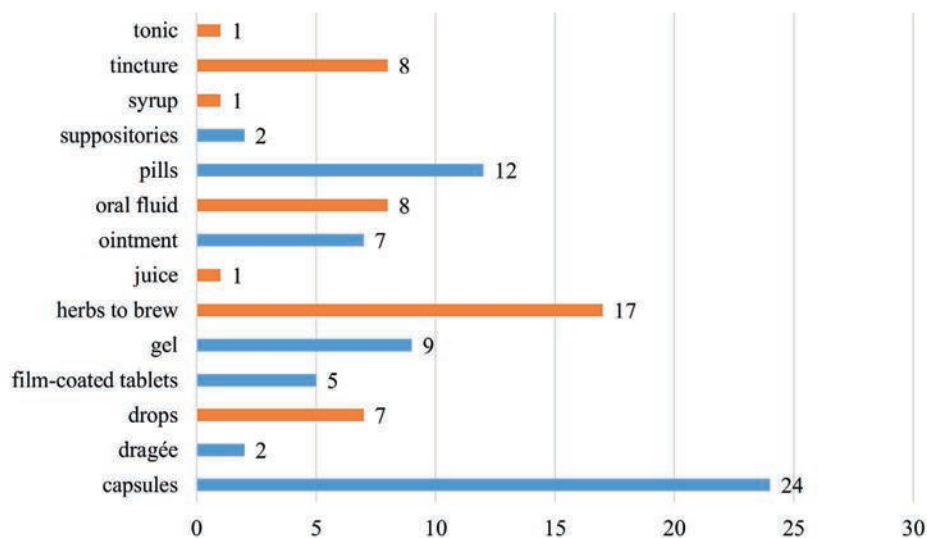
The aim of this study was to analyse the composition of commercially available medications, herbal preparations and dietary supplements on the Polish market, and on this basis to create a systematic list of plants most often used in the treatment and prevention of cardiovascular diseases.

## Methods

The compositions of medicines and preparations of plant origin (dietary supplements, mixtures), available without a prescription in pharmacies and herbal stores in southern Poland were analysed in order to recognise plant taxa used. A total of 100 preparations, randomly chosen, were taken into consideration. Most of which were sold as capsules, infusing herbs and pills (Fig. 1; Tab. 1 – Appendix 1). In few cases, the medications were attainable in various forms. In overall, 61% of analysed medications have a solid form (capsules, dragée, film-coated tablets, pills, etc.).

On this base, a list of species used in the treatment of cardiovascular diseases was compiled. The properties of plants were characterised in terms of this group of diseases, based on the available bibliography, including: Ożarowski and Jaroniewski (1987), Świejkowski (1990), Broda and Mowszowicz (2001), Jeziorski (2009), Kohlmünzer (2010), Błach-Olszewska et al. (2014), Senderski (2016), and others.

When characterising plants, their systematic position, geographic range, type of plant substance (raw material), content of active compounds, therapeutic effect in the analysed group of diseases and available preparations (trade names) were taken into account. Systematic position of taxa was assumed on the basis of Stevens (2001), authors of family



**Fig. 1.** The forms of medications, dietary supplements and plant substances supporting the treatment of cardiovascular diseases available on the Polish market (blue columns represent solid form, orange are for liquid)

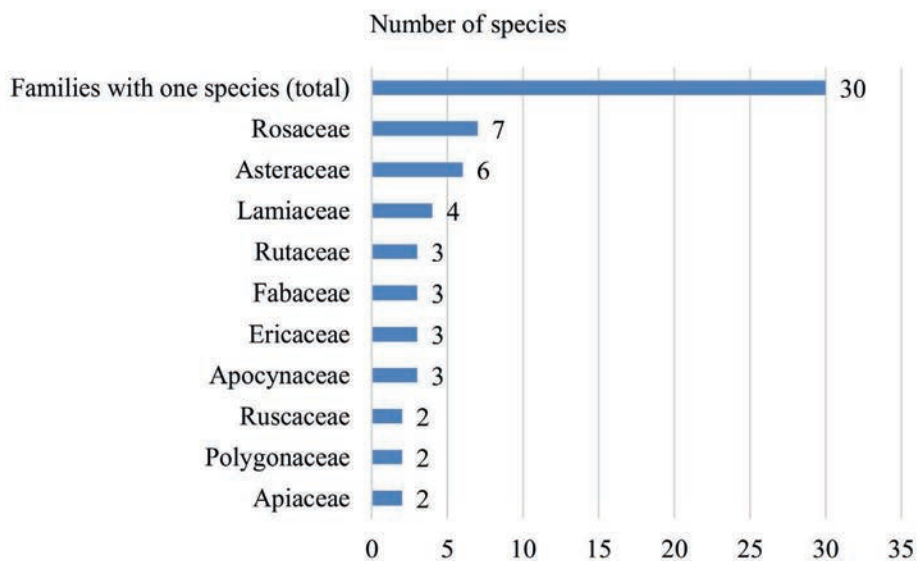
names were given according to Reveal (2007). Latin nomenclature of native plants followed Mirek et al. (2020), and alien plant species according to Podbielkowski and Sudnik-Wójcikowska (2003), or other available sources (e.g. POWO, 2021).

## Results

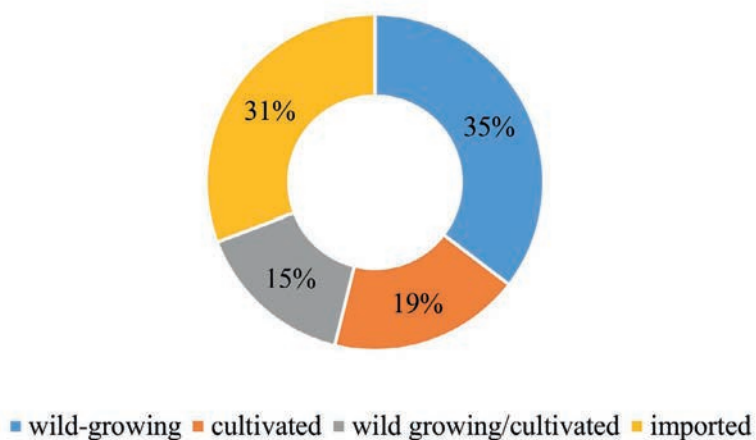
The compiled systematic list of plants used in analysed medicaments includes 65 taxa, two of which are given in the rank of genus – *Rubus* and *Salix*, and the rest in the rank of species. The most common species used in the analysed group of preparations are seed plants (63 taxa) – the other two are: a species representing algae from the Phaeophyta divisio (*Fucus vesiculosus* L.) and a species from the Tracheophyta, Equisetopsida classes (*Equisetum arvense* L.). In the case of genera *Allium*, *Cola*, *Crataegus* and *Panax*, double species are given as their raw materials as they are often used together in a mixture (Tab. 2 – Appendix 1).

The taxa recorded in this group of herbal plants belong to 40 families. The most species represent the Rosaceae, Asteraceae and Lamiaceae families. A large group consists of single species representatives of as many as 30 families (Fig. 2).

Among the noticed taxa, 23 are native to Central Europe, while 20 are alien species for the European flora, and their raw materials are imported from different regions of the world (Fig. 3; Table 2 – Appendix 1).



**Fig. 2.** Taxonomical representation of seed plant species used in the medications of the cardiovascular diseases



**Fig. 3.** The origin of raw plant materials from medications available in Polish markets used in cardiovascular diseases

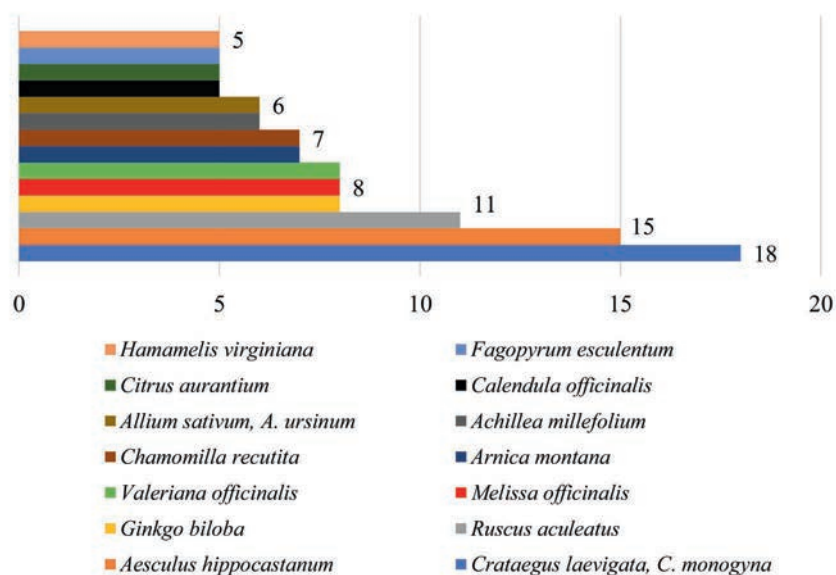


Fig. 4. The frequency of plant species used as ingredients of medicaments of cardiovascular diseases (found at least in five percentage of preparations)

Some species are cultivated due to the better quality of the raw material – this applies to both native and alien plants.

The most common raw material used in preparations available on the market is the genus *Crataegus* and species such as: *Aesculus hippocastanum* or *Ruscus aculeatus* (Fig. 4).

Most plants show vasoprotective activity (Lat. *vasotonicum*); its mechanism is to seal the walls of blood vessels, thus preventing them from breaking. This group of species contains 23 taxa e.g. *Aesculus hippocastanum*, *Arnica montana*, *Ginkgo biloba*, *Malpigia glabra* (Tab. 3 – Appendix 1). In addition, a large group of plants lowers blood pressure (Lat. *hypotonicum*), (e.g. *Achillea millefolium*, *Crataegus laevigata*, *Fucus vesiculosus*, *Kalmia latifolia*), has a diastolic effect (Lat. *spasmolyticum*) (e.g. *Ammi visnaga*, *Leonurus cardiaca*, *Ruta graveolens*) and strengthens the heart (e.g. *Adonis vernalis*, *Ophiopogon japonicus*, *Passiflora incarnata*).

## Discussion

On the streets of many cities, herbal shops and bio-supermarkets specialising in the sale of herbs and other ecological products are more and more often found, proving a great interest in natural methods of treatment. Some of the clients see them as an opportunity to improve their health or want to stop using synthetic medicines for oth-

er reasons. For patients struggling with numerous side effects of medicines obtained through a synthetic route, herbal therapy may be an alternative method of treatment (Brzeziński, 2014; Senderski, 2016; Liperoti et al., 2017; Easley, Horne, 2019). For medicinal purposes, plant raw materials are often obtained from wild specimens and then purchased by herbal or pharmaceutical companies. Trade preparations of this type of companies have become the basis for compiling the list of medicinal plant species most often used in the treatment of cardiovascular diseases.

The systematic list prepared for this study includes 65 taxa of herbal plants. These taxa belong to 40 families (Tab. 2 – Appendix 1). Most of the plants used in this group of diseases belong to native to Central Europe floristic components (Fig. 3). However, there is also a large group of plants origin e.g. from the Mediterranean area; they are often cultivated for the needs of the pharmaceutical industry. These include, for example, toothpick-plant *Ammi visnaga* L., pot marigold *Calendula officinalis* L., maritime squill *Urginea maritima* Bak and others (Senderski, 2016). Some species alien to Central Europe with proven medicinal properties (e.g. Bayan et al., 2014; Romero et al., 2016; Marques et al., 2017) belong to plants cultivate for consumption, e.g. garlic *Allium sativum* L. or globe artichoke *Cynara scolymus* L., olive *Olea europaea* L. or are ornamental plants, e.g. ginkgo *Ginkgo biloba* L., witch-hazel *Hamamelis virginiana* L., horse chestnut *Aesculus hippocastanum* L. (e.g. Isah, 2015; Pizzorno et al., 2015; Zampieron, 2017; Abbas et al., 2020). The plants whose herbal substrates are imported from distant regions of the world include: thorny bamboo *Bambusa arundinacea* (Retz.) Willd. (e.g. Rathod et al., 2011), Barbados cherry *Malpighia glabra* L. (e.g. Johnson, 2003), maypop *Passiflora incarnata* Ker.-Gawl. (e.g. Krenn, 2002), night-blooming cereus cactus *Selenicereus grandiflorus* (L.) Brit. & Rose (Haque et al., 2015), Indian snakeroot *Rauvolfia serpentina* (L.) Benth. (e.g. Mittal et al., 2012), Ginseng *Panax* sp. (e.g. Pan et al., 2012) and others. These herbal substances are generally expensive due to indirect costs (transport, storage, etc.), therefore they are used much less frequently in the discussed group of preparations. However, their exoticism often makes them more attractive to the client who is looking for new products in supplements and drugs supporting synthetic therapies.

Each herbal plant has a different spectrum of activity. It is possible due to the various accumulation of active substances, such as: cardiac glycosides, flavonoids, alkaloids, anthocyanins and others (Kohlmünzer, 2010; Pizzorno et al., 2015; Fecowicz et al. 2020). Preparations with the content of cardiac glycosides, mainly digoxin, obtained from woolly foxglove *Digitalis lanata* Erth., are of significant importance in severe, chronic diseases. Preparations with pheasant's eye *Adonis vernalis* L., May bells *Convallaria majalis* L. and strophanthus *Strophantus gratus* L. are also of great importance (Sroka, 1988; Nowak, 2009). In addition to these plants with strong effects, herbs with mild antihypertensive properties are also helpful in treatment (de Souza et al., 2011; Al

Disi et al., 2016; Anwar et al., 2016), toning, sealing the vessels, and relaxing (Tab. 3) (Górnicka, 2012). In the Lamiaceae family, there are many plants containing essential oils, which are widely used not only in pharmacy or herbal medicine, but also in cosmetology and in the kitchen (Podbielkowski, Sudnik-Wójcikowska, 2003; Senderski, 2016; Kliszcz et al., 2021). Examples of this type of aromatic plant include rosemary *Rosmarinus officinalis* L. and Lemon balm *Melissa officinalis* L. They are also species that are used in supporting the treatment of cardiovascular diseases.

However, not all species with known healing properties in cardiovascular diseases are currently used in medicine, because they are very strong, with high content of glycosides, dangerous to health (Broda, Mowszowicz, 2001; Noskowicz-Bieronowa, 2006; Nowak, 2009). Some of them have been withdrawn from circulation due to their toxic effects and high accumulation properties in the organism, e.g. common foxglove (*Digitalis purpurea* L.), oleander (*Nerium oleander* L.) or white waterlily (*Nymphaea alba* L.), however, some medicaments are still available. Dioscorides has already written about the poisonous properties of oleandrin, an active substance isolated from common oleander. Its operation was also known during the times of Alexander the Great (Bohne, Dietze, 2008). In the history of herbal medicine, however, this plant is recorded not as highly toxic, but because of its therapeutic effects.

The group of plants most often used in the treatment and support of cardiovascular therapies includes such taxa as: *Crataegus* sp., *Aesculus hippocastanum*, or *Ruscus aculeatus* (Fig. 4). Many studies describe their therapeutic effect in the treatment of cardiovascular diseases. *A. hippocastanum* and *R. aculeatus* show primarily vasoprotective properties, while *Crataegus* additionally strengthens and improves the work of the heart (Tab. 2). However, there is still extensive research into other beneficial effects of these plants on the cardiovascular system (Shatoor, 2013; Wang et al., 2013). This especially applies to species used in Asian medicine based on traditional herbal folk medicine (Xiong et al., 2013; Khan et al., 2016; Liu, Huang, 2016).

The mere use of synthetic or herbal medicines may be insufficient in cardiac therapies, therefore it is important to change the diet, increase physical activity, and even change the environment or workplace (Sroka, 1988). Centuries of observations of taking various herbal remedies allow us to state that it is more effective and reliable to use many herbs in appropriately selected mixtures than individually (Senderski, 2016). Thanks to this, they can support each other and complement each other's action (Ożarowski, Jaroniewski, 1987; Matyjaszczyk et al., 2011; Górnicka, 2012). However, it is also important that in the case of serious diseases of the heart or the circulatory system, it should always take place under the strict supervision of a specialist doctor – cardiologist (Rogowska, Giermazaik, 2018).

## Conclusions

The paper presents an analysis of the group of medicines and herbal substances commonly available on the pharmaceutical market in Poland and used in the treatment of cardiovascular diseases. Its aim was to create a systematic list of plants used in over-the-counter medicinal preparations. The compiled systematic list includes 65 plant taxa. Among them, the most species belong to the families: Rosaceae (7), Asteraceae (6), Lamiaceae (4). The most common raw materials used in over-the-counter preparations are *Crataegus* sp., *Aesculus hippocastanum* and *Ruscus aculeatus*. Most plants show vasoprotective properties, lower blood pressure and diastolic. The systematic list includes 23 species of plants native to Central Europe, while plant substances from 20 are imported from more or less distant areas of the world. Some of the analysed species, rich in cardiac glycosides, were withdrawn from sale due to their toxicity or strong accumulation of active substances. Dosing of medicines with the content of cardiac glycosides must be under the constant supervision of a doctor, because they can easily be overdosed.

## Conflict of interest

The authors declare no conflict of interest related to this article.

## References

- Abbas, T., Abbas, M., Jarad, A. (2020). Antibacterial activity and medical properties of Witch Hazel *Hamamelis virginiana*. *Annals of Tropical Medicine and Public Health*, 23(S11), SP231146. <https://doi.org/10.36295/ASRO.2020.231146>
- Al Disi, S.S., Anwar, M.A., Eid, A.H. (2016). Anti-hypertensive herbs and their mechanisms of action: part I. *Frontiers in Pharmacology*, 6(323), 1–24. <https://doi.org/0.3389/fphar.2015.00323>
- Anwar, M.A., Al. Disi, S.S., Eid, A. (2016). Anti-hypertensive herbs and their mechanisms of action: part II. *Frontiers in Pharmacology*, 7(50), 1–25. <https://doi.org/10.3389/fphar.2016.00050>
- Bayan, L., Koulivand, P.H., Gorji, A. (2014). Garlic: a review of potential therapeutic effects. *Avicenna Journal of Phytomedicine*, 4(1), 1–14.
- Beaglehole, R., Saracci, R., Panico S. (2001). Cardiovascular diseases: causes, surveillance and prevention. *International Journal of Epidemiology*, 30(Suppl. 1), 1–4. [https://doi.org/10.1093/ije/30.suppl\\_1.S1](https://doi.org/10.1093/ije/30.suppl_1.S1)
- Bejček, J., Jurášek, M., Spiwok, V., Rimpelová, S. (2021). Quo vadis Cardiac Glycoside Research? *Toxins*, 13(5), 344. <https://doi.org/10.3390/toxins13050344>
- Błach-Olszewska, Z., Dobryczycka, W., Kowal-Gierczak, B. (2014). *Fitoterapia i leki roślinne (Phytotherapy and herbal medicines)*. Warszawa: Wydawnictwo Lekarskie PZWL. [In Polish]
- Bohne, B., Dietze, P. (2008). *Rośliny trujące: 170 gatunków roślin ozdobnych i dziko rosnących (Poisonous plants: 170 species of ornamental and wild plants)*. Warszawa: Wydawnictwo Bellona. [In Polish]
- Broda, B., Mowszowicz, J. (2001). *Przewodnik do oznaczania roślin leczniczych, trujących i użytkowych (Guide to the labeling of medicinal, poisonous and utility plants)*, VI ed. Warszawa: PZWL. [In Polish]
- Brzeziński, T. (2014). *Historia medycyny (History of Medicine)*, Warszawa: Wydawnictwo Lekarskie PZWL. [In Polish]



- Capasso, R., Izzo, A. A., Pinto, L., Bifulco, T., Vitobello, C., Mascolo, N. (2000). Phytotherapy and quality of herbal medicines. *Fitoterapia*, 71(Suppl 1), 58–65. [https://doi.org/10.1016/S0367-326X\(00\)00173-8](https://doi.org/10.1016/S0367-326X(00)00173-8)
- de Souza, P., Gasparotto, J.A., Crestani, S., Alves Stefanello, M.E., Andrade Marques, M.C., da Silva-Santos, J.E., Leite Kassuya, C.A. (2011) Hypotensive mechanism of the extracts and artemet in isolated from *Achillea millefolium* L. (Asteraceae) in rats. *Phytomedicine*, 18, 819–825. <https://doi.org/10.1016/j.phymed.2011.02.005>
- Easley, T., Horne, S. (2019). *Zioła, które leczą. Nowoczesna roślinna apteka w twoim domu (Herbs that heal. A modern plant pharmacy in your home)*. Białystok: Wydawnictwo Kobiectwo. [In Polish]
- Flora Polski – atlas-roślin.pl <http://www.atlas-roslin.pl> [version of the atlas 21.10.03; access: 2002-2021]. [In Polish]
- Fecowicz, M., Możdżeń, K., Barabasz-Krasny, B., Stachurska-Swakoń, A. (2020). Allelopathic influence of medicinal plant *Filipendula vulgaris* Moench on germination process. *Notulae Botanicae Horti Agrobotanici Cluj-Napoca*, 48(4), 2032–2049. <https://doi.org/10.15835/48412148>
- Górnicka, J. (2012). *Choroby układu krążenia. Biblioteka Zdrowia (Cardiovascular disease. Health Library)*, Warszawa: Wydawnictwo Jerzy Mostowski. [In Polish]
- Haque, S.E., Verma, R.K., Khan, V., Sharma S. (2015). *Cactus grandiflorus*: a homeopathic remedy for cardiac ailment. *Indian Journal of Pharmacy and Pharmacology*, 2(1),74–80.
- Isah, T. (2015). Rethinking *Ginkgo biloba* L.: medicinal uses and conservation. *Pharmacognosy Reviews*, 9(18), 140–148. <https://doi.org/10.4103/0973-7847.162137>
- Jeziorski, K.G. (2009). *Pharmindeks, brevier podręczny indeks leków (Pharmindeks, a brevier reference medicine index)*. Warszawa: Wydawnictwo CMP Medica Sp. z o.o. [In Polish]
- Johnson, P.D. (2003). *Acerola (Malpighia glabra L., M. punicifolia L., M. emarginata D.C.): agriculture, production and nutrition. World Review of Nutrition and Dietetics*, 91, 67–75. <https://doi.org/10.1159/000069930>
- Khan, T., Ali, S., Qayyum, R., Hussain, I., Wahid, F., Shah, A.J. (2016). Intestinal and vascular smooth muscle relaxant effect of *Viscum album* explains its medicinal use in hyperactive gut disorders and hypertension. *BMC Complementary and Alternative Medicine*, 16, 251. <https://doi.org/10.1186/s12906-016-1229-3>
- Kliszcz, A., Danel, A., Puła, J., Barabasz-Krasny, B., Możdżeń, K. (2021). Fleeting beauty – the world of plant fragrances and their application. *Molecules*, 26, 2473. <https://doi.org/10.3390/molecules26092473>
- Kohlmünzer, S. (2010). *Farmakognozja (Pharmacognosy)*, V ed. (reprint). Warszawa: Wydawnictwo Lekarskie PZWL. [In Polish]
- Krenn, L. (2002). Passionflower (*Passiflora incarnata* L.) – a reliable herbal sedative. *Wiener Medizinische Wochenschrift*, 152(15–16), 404–406. [10.1046/j.1563-258x.2002.02062.x](https://doi.org/10.1046/j.1563-258x.2002.02062.x)
- Länger, R., Stöger, E., Kubelka, W., Helliwell, K. (2017). Quality standards for herbal drugs and herbal drug preparations – appropriate or improvements necessary? *Planta Medica*, 84(6–07), 350–360. <https://doi.org/10.1055/s-0043-118534>
- Lewkowicz-Mosiej, T. (2017). *Zioła w leczeniu chorób cywilizacyjnych (Herbs in the treatment of civilisation diseases)*. Poznań: Wydawnictwo Zysk i S-ka. [In Polish]
- Liperoti, R., Vetrano, D.L., Bernabei R., Onder G. (2017). Herbal medications in cardiovascular medicine. *Journal of the American College of Cardiology*, 69(9), 1188–1199. <https://doi.org/10.1016/j.jacc.2016.11.078>
- Liu, C., Huang, Y. (2016). Chinese herbal medicine on cardiovascular diseases and the mechanisms of action. *Frontiers in Pharmacology*, 7, 469. <https://doi.org/10.3389/fphar.2016.00469>
- Marques, P., Marto, J., Gonçalves, L., Pacheco, R., Fitas, M., Pinto, P., Serralheiro, M.L., Ribeiro, H. (2017). *Cynara scolymus* L.: A promising Mediterranean extract for topical anti-aging prevention. *Industrial Crops and Products*, 109(109), 699–706. <https://doi.org/10.1016/j.indcrop.2017.09.033>

- Matyjaszczyk, P., Hoffmann, K., Bryl, W. (2011). Epidemiologia wybranych czynników ryzyka chorób układu krążenia (Epidemiology of selected risk factors for cardiovascular diseases). *Przegląd Kardiologiczny*, 6(4), 255–262. [In Polish]
- Mirek, Z., Piękoś-Mirkowa, H., Zajac, A., Zajac, M. (2020). *Vascular plants of Poland. Annotated checklist*, Kraków: W. Szafer Institute of Botany, Polish Academy of Sciences, Drukarnia Rubin sp.z.o.o.
- Mittal, B., Meenakshi, D., Sharma, A., Gothecha, K.V. (2012). Phytochemical & pharmacological activity of *Rauvolfia serpentina* – a review. *International Journal of Ayurvedic and Herbal Medicine*, 2(3), 427–434.
- Noskowicz-Bieronowa, H. (2006). *Z sercem do ziół (With a heart for herbs)*. Kraków: Wydawnictwo Emilia. [In Polish]
- Nowak, G. (2009). Surowce roślinne stosowane w chorobach układu krążenia i serca (Plant materials used in cardiovascular and heart diseases). *Herba Polonica*, 55(2), 100–120. [In Polish]
- Ożarówski, A., Jaroniewski, W. (1987). *Rośliny lecznicze i ich praktyczne zastosowania (Medicinal plants and their practical applications)*. Warszawa: Wydawnictwo IWZZ. [In Polish]
- Palmieri, L., Veronesi, G., Corrao, G., Traversa, G., Ferrario, M.M., Nicoletti, G., Di Lonardo, A., Donfrancesco, C., Carle, F., Giampaoli, S. (2018). Cardiovascular diseases monitoring: lessons from population-based registries to address future opportunities and challenges in Europe. *Archives Public Health*, 76, 31. <https://doi.org/10.1186/s13690-018-0283-3>
- Pan, C., Huo, Y., An, X., Singh, G., Chen, M., Chen, Z., Pu, J., Li, J. (2012). *Panax notoginseng* and its components decreased hypertension via stimulation of endothelial-dependent vessel dilatation. *Vascular Pharmacology*, 56, (3–4), 150–158. <https://doi.org/10.1016/j.vph.2011.12.006>
- Pizzorno, J.E., Murray, M.T., Joiner-Bey, H. (2015). *The Clinician's Handbook of Natural Medicine*, 3rd ed. Churchill Livingstone: Elsevier. <https://doi.org/10.1016/C2010-0-67298-1>
- Podbielkowski, Z., Sudnik-Wójcikowska, B. (2003). *Słownik roślin użytkowych (Dictionary of crop plants)*. VI ed. Warszawa: PWRiL. [In Polish/Latin/English/French/German/Russian]
- POWO, (2021). *Plants of the World Online*, Facilitated by the Royal Botanic Gardens, Kew. <http://www.plantsoftheworldonline.org/Retrieved> 14 October 2021.
- Rathod, J.D., Pathak, N.L., Patel, R.G., Jivani, N.P., Bhatt, N.M. (2011). Phytopharmacological properties of *Bambusa arundinacea* as a potential medicinal tree: An overview. *Journal of Applied Pharmaceutical Science*, 1(10), 27–31.
- Reveal, J.L. (2007). Classification of extant Vascular Plant Families – An expanded family scheme. <http://www.plantsystematics.org/reveal/pbio/fam/vascplfam.html>.
- Rogowska, M., Giermazaik, W. (2018). Wpływ roślin leczniczych na farmakokinetykę i metabolizm leków syntetycznych (Effect of medicinal plants on the pharmacokinetics and metabolism of synthetic medicines). *Postępy Fitoterapii*, 19(4), 274–282. [In Polish] <http://dx.doi.org/10.25121/PF.2018.19.4.274>
- Romero, M., Toral, M., Gómez-Guzmán, M., Jiménez, R., Galindo, P., Sánchez, M., Olivares, M., Gálvez, J., Duarte, J. (2016). Antihypertensive effects of oleuropein-enriched olive leaf extract in spontaneously hypertensive rats. *Food and Function*, 7(1), 584–593. <http://dx.doi.org/10.1039/c5fo01101a>
- Senderski, M.E. (2016). *Prawie wszystko o ziołach. Seria Mądrość Natury (Almost everything about herbs. The Wisdom of Nature series)*, 3 ed. Podkowa Leśna: Wydawnictwo Mateusz E. Senderski. [In Polish]
- Shatoor, A.S. (2013). In vivo hemodynamic and electrocardiographic changes following *Crataegus aronia* syn. *Azarolus* L administration to normotensive Wistar rats. *Saudi Medical Journal*, 34(2), 123–134.
- Sroka, O.G.F. (1988). *Poradnik ziołowy (Herbal tutorial)*. Warszawa: Wydawnictwo IWZZ. [In Polish]
- Stevens, P.F. (2001). Angiosperm Phylogeny Website, Version 14, July 2017 [and more or less continuously updated since]. <http://www.mobot.org/MOBOT/research/APweb/>.

- Świejkowski, L. (1990). *Rośliny lecznicze i przemysłowe: klucz do oznaczania (Medicinal and industrial plants: the key to marking)*. Warszawa: Wydawnictwo Libra. [In Polish]
- Szot-Radziszewska, E. (2005). *Sekrety ziół. Wiedza ludowa, magia, obrzędy, leczenie (Secrets of herbs. Folk knowledge, magic, rituals, treatment)*. Warszawa: Wydawnictwo TRIO. [In Polish]
- Szweykowska, A., Szweykowski J. (2003). *Słownik botaniczny (Botanical dictionary)*. Warszawa: Państwowe Wydawnictwo Wiedza Powszechna. [In Polish]
- Wang, J., Xiong, X., Feng, B. (2013). Effect of *Crataegus* usage in cardiovascular disease prevention: an evidence-based approach. *Evidence-Based Complementary and Alternative Medicine*, 2013, 149363. <http://dx.doi.org/10.1155/2013/149363> 1-16
- Wojtyniak, K., Szymański, M., Matławska, I. (2013). *Leonurus cardiaca* L. (Motherwort): a review of its phytochemistry and pharmacology. *Phytotherapy Research*, 27(8), 1115–1120. <http://dx.doi.org/10.1002/ptr.4850>
- Xiong, X., Yang, X., Liu, Y., Zhang, Y., Wang, P., Wang, J. (2013). Chinese herbal formulas for treating hypertension in traditional Chinese medicine: perspective of modern science. *Hypertension Research*, 36(7), 570–579. <http://dx.doi.org/10.1038/hr.2013.18>
- Zampieron, E. (2017). Horse chestnut (*Aesculus hippocastanum*) for venous insufficiency. *International Journal of Complementary and Alternative Medicine*, 5(3), 00153. <https://doi.org/10.15406/ijcam.2017.05.00153>

**Tab. 1.** The herbal medicines sold in the polish market used in cardiovascular diseases

Form of the herbal medicine	Trade name of the herbal medicine
capsules	Alitol, Alliofil forte, Alliogal, Alliomax, Bilberin, Bilobil, Bodymax plus, Diosmina plus, Extraspasmina, Garlicin, Ginkgo caps, Ginkogins, Kapsułki Aronia, Krążenie I Love Herbs, Liść Oliwny, Na ciśnienie kapsułki, Rosavit C, Ruscoven plus, Rutina C max, Sapoven T, Veno 33 complex, VenoCorector, Venox, Żeń-szeń vita complex,
dragée	Convafort, Venescin,
drops	Cardiol C krople, Heel cralonin krople, Kelicardina, Neocardina, Neospasmina, Ribes nigrum – macerat glicerynowy, Venol,
film-coated tablets	Ginkofar, Ginselin, Proscillaridin, Sylicynar, Varixinal, Venosol Bonifraters,
gel	Aescin żel, Arnical żel, Esceven, Essaven gel, Latan żel, Neo-aesculan żel, Preparation H żel, Venescin, Venoczar żel,
herbs to brew	Barwinek pospolity (Vina minor), Bio hibiscus, Bratek fix, Cardiosan, Ciśnienie norma – herbatka ziołowa, Herba Asperulae, Herba Betonicae, Herbatka fix Żylaczek, Krwiściąg lekarski ziele, Nervosan fix, Neurosin Tea, Owoc jarzębiny herbatka ziołowa, Rektosan, Sklerosan, Viola – fix, Ziele krwiściągu,
juice	Aronia sok 100%,
ointment	Aesculan, Arcalen, Esceven, Maść nagietkowa, Ruscogenin, Ruscolan, Venescin,
oral fluid	Cravisol, Doppel Herz Vital, Intractum Hippocastani, Intractum Visci, Nervosol, Passispasmina, Rutisol, Venoforton
pills	Bratek, Colladen, Cynarex, Diostrin, Esceven, Głóg zioła w tabletkach, Hemorigen femina, Neospasmina, Rutinosal C, Serpina, Strophanthus Comp., Tabletki tonizujące, Tabletki z czosnku,
suppositories	Hemorol, Ruskorex,
syrop	Syrop malina z kwiatem bzu czarnego z wit. C,
tincture	Cardiactiv – nalewka, Cardio farm – nalewka, Cardiotonic – nalewka, Tinctura Adonidis vernalis, Tinctura Ammi visnagae, Tinctura Arnicae, Tinctura Ginkgo bilobae, Tinctura Sophorae japonicae
tonic	Plusz gold vital

**Tab. 2.** Systematic list; short characteristics of herbs used in supplementation and treatment of cardiovascular diseases

Species	Geographic range	Plant material	Active compounds	Effect	Occurrence in medicines or supplements (Polish trade names)
<i>Fucaceae</i> Adanson					
1) <i>Fucus vesiculosus</i> L.	North Sea and North Atlantic	thallus	organically bound iodine, polysaccharides (alginic acid, fucoidin, laminarin), mannitol, fucoxanthin, bromine, B vitamins, mineral salts	in the prevention of hypertension, dilates blood vessels, prevents atherosclerosis	Sklerosan
<i>Equisetaceae</i> Michx. ex DC.					
2) <i>Equisetum arvense</i> L.	cosmopolitan	herb ( <i>Equiseti herba</i> )	flavonoids (e.g. isoquercetin, apigenin), silicon compounds, phenolic acids (e.g. caffeic acid), saponins, vitamins, minerals, polyenic acids and pyridine derivatives	increases the amount of erythrocytes and haemoglobin in the blood, anti-atherosclerotic, anti-haemorrhagic	Cisnienie norma – herbatka ziolowa, Herbatka fix Żylaczek
<i>Ginkgoaceae</i> Engl.					
3) <i>Ginkgo biloba</i> L.	Japan, China; cultivated in America and Europe	leaf ( <i>Ginkgonis folium</i> )	sesquiterpenes (bilobalid), diterpenes (ginkgolides A, B, C, J, M), flavonoids, sterols, fatty acids	improves circulation in the brain, memory and concentration, has anticoagulant and vasoprotective properties	Bilobil, Ginkgo caps, Ginkofar, Ginkogins, Krażenie I Love Herbs-caps, Tinctura Ginkgo bilobae, Venoforton, Venol
<i>Alliaceae</i> Borkh.					
4) <i>Allium sativum</i> L., <i>A. ursinum</i> L.	Central Asia; cultivated	bulb ( <i>Allii sativi bulbus</i> , <i>Allii sativi pulvis</i> ), herb/ leaf ( <i>Allii ursini herba/folium</i> )	allicin and its derivatives	hypotensive, anti-atherosclerotic, anti-coagulant	Alitol, Alliofil forte, Allioagal, Alliomax, Garlicin, Tabletki z czosnku

Plants supporting the treatment of cardiovascular diseases

<i>Hyacinthaceae</i> Batsch ex Borkh.				
5) <i>Urginea maritima</i> Bak (= <i>Scilla maritima</i> L.)	Mediterranean basin	bulb ( <i>Bulbus Scillae</i> )	among others: scillaren A, proscillaridin A	cardiotonic: anti-arrhythmic, strengthening the activity of the heart muscle  Proscillaridin
<i>Convallariaceae</i> Horan				
6) <i>Convallaria majalis</i> L.	Europe, North America, West Asia	herb ( <i>Herba Convallariae</i> )	convallatoxin, convallioside, convallatoxol	cardiotonic: anti-arrhythmic, strengthening the activity of the heart muscle  Cardiol C, Convafor, Kelcardina
<i>Ruscaceae</i> Spreng.				
7) <i>Ophiopogon japonicus</i> (L. f.) Ker.-Gawl.	South-East Asia	rhizome, root ( <i>Radix Ophiopogonis</i> )	ophiogenin, ruscogenins, spirostans, ophioside A, monoterpene glycoside, ophiopogonol	Ruscogenin  anti-swelling, vasoprotective, in the treatment of varicose veins and haemorrhoids; strengthens the heart and improves blood circulation; anticoagulant; used as an auxiliary after a stroke
8) <i>Ruscus aculeatus</i> L.	Mediterranean basin	rhizome ( <i>Rusci rhizoma</i> )	steroid saponins (ruscogenin, ruscin, ruscoside), essential oil	Diosmina plus, Diostrin, Krażenie I Love Herbs-caps, Ruscogenin, Ruscolan, Ruscoven plus, Ruskorex, Varixinal, Veno 33 complex, VenoCorrector, Venox
<i>Poaceae</i> Barnhart (= <i>Gramineae</i> ) Juss.				
9) <i>Bambusa arundinacea</i> (Retz.) Willd. (= <i>B. bambos</i> (L.) Voss)	South China, Indian subcontinent	leaf, seed, root	amino acids, silica, polysaccharides, minerals, vitamins (riboflavin, thiamine, vitamin C, niacin and $\beta$ -carotene), resins, waxes	VenoCorrector  anti-atherosclerotic, vasoprotective, anti-haemorrhagic

<i>Ranunculaceae</i> Juss.						
10) <i>Adonis vernalis</i> L.	Europe, Asia	flowering herb ( <i>Herba Adonidis vernalis</i> )	cardenolide glycosides (e.g. adonitoxin, adonitoxol), flavonoids (e.g. vitexin, luteolin), phyosterols, choline, adonitol	cardiotonic: anti-arrhythmic – strengthens and improves the activity of the heart muscle, calming	Kelicardina, Tinctura Adonidis vernalis (currently on prescription)	
<i>Hamamelidaceae</i> R. Br.						
11) <i>Hamamelis virginiana</i> L.	North America; cultivated in Europe	leaf ( <i>Hamamelidis folium</i> )	tannins (galatunins, gallic acid), flavonoids, saponins	astringent, anti-haemorrhagic	Latan zel, Preparation H zel, Ruscoven plus, Venoczar zel, Venosol Bonifraters	
<i>Grossulariaceae</i> DC.						
12) <i>Ribes nigrum</i> L.	Europe, Asia	leaf ( <i>Folium Ribis nigri</i> ), fruit ( <i>Fructus Ribis nigri</i> )	flavonoids (rutoside), tannins, anthocyanins, vitamin C	astringent, vasoprotective; has a positive effect on circulation and heart function	<i>Ribes nigrum</i> – macerat glycerynowy	
<i>Vitaceae</i> Juss.						
13) <i>Vitis vinifera</i> L.	Mediterranean basin and South-West Asia; cultivated	fruit ( <i>Vitis Vinifera Fructus Extractum</i> ), seed ( <i>Vitis Vinifera Semen Extractum</i> ), leaf ( <i>Vitis Vinifera Foliium Extractum</i> )	tannins, anthocyanins, flavonoids, waxes, vitamins, procyanidins, pectins, polysaccharides, aromatics, carotenoids; stilbene derivatives: resveratrol, trans-resveratrol and viniferine	in cardiovascular disorders, it prevents atherosclerosis and ischemic heart disease	Colladen, Doppel Herz Vital, Kraženie I Love Herbs-caps, Ruscoven plus	

<i>Malpighiaceae</i> Juss.					
14) <i>Malpighia glabra</i> L.	South part of North America, Central America, northern part of South America	fruit extract ( <i>Fructus Extractum Malpighia glabra</i> )	source of vitamin C	seals capillaries	Rosavit C
<i>Violaceae</i> Batsch					
15) <i>Viola tricolor</i> L. s.st.	Europe, North America, North Africa, Asia (Siberia)	herb ( <i>Herba Viola tricoloris</i> )	flavonoids (rutin, quercetin), anthocyanins (violandin), phenolic acids, carotenoids (violaxanthin), mucilages and tannins	vasoprotective, toning	Bratek, Bratek fix, Rektosan, Viola – fix
<i>Passifloraceae</i> Juss. ex Rousset					
16) <i>Passiflora incarnata</i> Ker.-Gawl.	South-East USA; cultivated in Central and South America	herb ( <i>Herba Passiflorae</i> )	indole alkaloids, flavonoids, cyanogenic glycoside, phytosterols, mineral salts, pasiflorin	lowers blood pressure, strengthens the heart, reduces spasms of the coronary vessels	Passipasmina
<i>Salicaceae</i> Mirb.					
17) <i>Salix</i> sp.	cosmopolitan	bark ( <i>Cortex Salicis</i> )	salicin, flavonoids, chalcones, phenolic glycosides, sterols, terpenes and others	anti-coagulant, sealing on blood vessels	Rutinosal C
<i>Fabaceae</i> Lindl. ( <i>Leguminosae</i> Juss. = <i>Papilionaceae</i> Giseke)					
18) <i>Melilotus officinalis</i> (L.) Pall.	Europe, Central Asia; introduced in America	herb ( <i>Meliloti herba</i> )	coumarin, dicoumarol, coumaric acid, mylytoside, allantoin, flavonoids, tannins	anti-coagulants, anti-swelling, in the treatment of poorly healing wounds and haemorrhoids	Tabletki tonizujace



19) <i>Sarothamnus scoparius</i> (L.) Wimm. ex W.D.J. Koch	Central and South Europe	herb ( <i>Herba Sarothammi</i> )	quinolizidine alkaloids (sparteine, lupanine, hydroxylupanine, sarotamine), amines, flavonoids	anti-arrhythmic, strengthens the heart, increases blood pressure and dilates blood vessels	Cardiosan, Hemorol
20) <i>Sophora japonica</i> L. (= <i>Styphnolobium japonicum</i> (L.) Schott)	China, Korea; cultivated	flower ( <i>Sophorae japonicae flos</i> ), fruit ( <i>Sophorae japonicae fructus</i> )	flavonoids (quercetin, rutin), phospholipids, alkaloids, polysaccharides, essential oils, organic acids, vitamins C, P	supports the work of the heart, normalises blood pressure, strengthens blood vessels, anti-coagulants	Krażenie I Love Herbs-caps, Tinctura Sophorae japonicae
Rosaceae Juss.					
21) <i>Aronia melanocarpa</i> (Michx.) Elliott	North America; cultivated in Europe	fruit ( <i>Aroniae fructus</i> )	anthocyanins, flavonoids, tannins, organic acids, pectins	hypotensive, supports the functioning of the circulatory system, in hypertension, in haemorrhoids	Aronia sok 100%, Herbatka fix Żyłaczek, Kapsułki Aronia, Na ciśnienie kapsułki
22) <i>Crataegus laevigata</i> (Poi.) DC. and C. <i>monogyna</i> Jacq.	Europe, Asia, North Africa	inflorescence ( <i>Inflorescentia Crataegi</i> ), fruit ( <i>Crataegi fructus</i> )	flavonoids (vitamin, rutoside, apigenin), amines (choline, acetylcholine), phenolic acids (caffeic acid), coumarins (esculin), phytosterols, B vitamins, vitamin C	cardiotonic, hypotensive, relaxant, vasoprotective	Cardiactiv – nalewka, Cardiol C, Cardiotonic, Ciśnienie norma – herbatka ziołowa, Cravisol, Doppel Herz Vital, Extraspazmina, Głóg zioła w tabletkach, Kelcardina, Neocardina, Neospasmina, Neurosin Tea, Passispassmina, Plusz gold vital, Sklerosan, Strophanthus Comp., Tabletki tonizujące, Venoforton,
23) <i>Potentilla erecta</i> (L.) Raesch.	Central and northern Europe, Asia	rhizome ( <i>Tormentillae rhizoma</i> )	tannins, ellagic acid, quinonic acid, tormentoside	anti-haemorrhagic, diastolic, astringent	Hemorol

24) <i>Rosa canina</i> L.	northern hemisphere	floral cup – hypanthium ( <i>Fructus Rosae</i> )	flavonoids, anthocyanins, carotenoids, xanthophylls, tannins, vitamins C, E, K, P and group B	strengthening capillaries, anti-spasmodic, toning	Cardiosan, Neocardina, Plusz gold vital, Rosavit C,
25) <i>Rubus</i> sp.	Europe, Asia	fruit ( <i>Fructus Rubi</i> )	anthocyanins, tannins, vitamin C	supports the work of the circulatory system: increase the elasticity of capillaries and strengthens and detoxifies the heart	Cardiosan
26) <i>Sanguisorba officinalis</i> L.	Europe, Asia, North America	rhizome ( <i>Radix Sanguisorbae</i> ), herb ( <i>Herba Sanguisorbae</i> ).	tannins, saponins, flavonoids	in haemorrhoids, anti- haemorrhagic	Ziele krwisiągu
27) <i>Sorbus aucuparia</i> L. emend. Hedl.	Europe, Asia	flower ( <i>Sorbi flos</i> ), fruit ( <i>Sorbi fructus</i> )	organic acids, carotenoids, tannins, bitterness, sorbitol, vitamin C	anti-atherosclerotic, anti- inflammatory, astringent	Owoc jarzębiny herbatka ziołowa Rektosan, Sklerosan
<i>Urticaceae</i> Juss.					
28) <i>Urtica dioica</i> L.	cosmopolitan	leaf ( <i>Folium Urticae</i> ), root ( <i>Radix Urticae</i> ), seed ( <i>Semen Urticae dioicae</i> )	tannins, carotenoids, flavonoids, microelements, amines, vitamins B, C, K	hypotensive, tonic, anti-haemorrhagic, anti- spasmodic, anti-anaemic	Cardio farm
<i>Hippocastanaceae</i> DC.					
29) <i>Aesculus hippocastanum</i> L.	Balkan Peninsula; cultivated in Europe	kora ( <i>Cortex Hippocastani</i> ), flower ( <i>Flos Hippocastani</i> ), fruit ( <i>Fructus Hippocastani</i> <i>immaturus</i> ), seed ( <i>Semen Hippocastani</i> )	saponins (escin), coumarins (esculin, esculetin), flavonoids, flavones	vasoprotective, anti-edema, anti-haemorrhagic, in the treatment of peripheral system disorders, varicose veins or haemorrhoids	Aescin żel, Aesculan, Esceven, Hemorol, Herbatka fix Żylaczek, Intractum Hippocastani, Krażenie I Love Herbs, Latan żel, Neo-aesculan żel, Rektosan, Sapoven T, Varixinal, Venescin, Venoforton, Venol

Rutaceae Juss.						
30) <i>Citrus aurantium</i> L.	South-East Asia	pericarp ( <i>Aurantii amari epicarpium et mesocarpium</i> ), flower ( <i>Aurantii amari flos</i> )	essential oils, rutin, naringin, hesperidin, vitamin P	seals blood vessels; increases blood pressure	Kraženie I Love Herbs, Rutina C max, Veno 33 complex, VenoCorector, Venox	
31) <i>Citrus limon</i> Burm. f.	South-East Asia; cultivated in many countries	pericarp ( <i>Citri pericarpium</i> )	rutin, vitamins C and B <sub>1</sub> and citric acid	seals blood vessels	Diospirin	
32) <i>Ruta graveolens</i> L.	Europe, North Africa	herb ( <i>Herba Rutae</i> ), leaf ( <i>Folium Rutae</i> )	flavonoids (rutin, quercetin), furanocoumarins, quinoline, acridine and furancinoline alkaloids	vasoprotective, diastolic, hypotensive, anti-edema; improves peripheral circulation	VenoCorector	
Sterculiaceae Vent.						
33) <i>Cola nitida</i> (Vent.) Schott & Endl. and <i>C. acuminata</i> (P. Beauv.) Schott & Endl.	West Africa	embryos from seeds ( <i>Colae semen</i> )	alkaloids, among others caffeine, theobromine	caffeine dilates the cerebral and coronary vessels of the heart and narrows the abdominal vessels; increases blood pressure	Cardiol C	
Malvaceae Juss.						
34) <i>Hibiscus sabdariffa</i> L.	tropical Africa; cultivated in Arab countries and India	flower ( <i>Hibisci sabdariffae flos</i> )	anthocyanins, polyphenols, flavonoids, organic acids (citric, malic, oxalic, hibiscus), source of vitamin C	lowers blood pressure and cholesterol – improves heart function	Bio hibiscus, Cardiosan	

Plants supporting the treatment of cardiovascular diseases

<i>Brassicaceae</i> Burnett	
35) <i>Capsella bursa-pastoris</i> (L.) Medik.	Eastern part of Mediterranean basin; currently cosmopolitan herb ( <i>Herba Bursae pastoris</i> ) flavonoids (e.g. rutin, diosmosis, hesperidin), amino acids (e.g. ornithine, $\alpha$ -aminobutyric acid), monoterpenoids, glucosinolates (synigrin), etc. astrigent, anti-haemorrhagic; in haemorrhoids Hemorigen femina
<i>Loranthaceae</i> Juss.	
36) <i>Viscum album</i> L.	Europe, Asia herb ( <i>Herba Visci</i> ) flavonoids (quercetin), amines (histamine, choline, acetylcholine), viscotoxins, phenolic acids (caffeic acid, ferulic acid) sedative, hypotensive; regulates the work of the heart and dilates the vessels Cravisol, Intractum Visci, Sklerosan, Venoforton
<i>Polygonaceae</i> Juss.	
37) <i>Fagopyrum esculentum</i> Moench	Europe, Central Asia. herb ( <i>Fagopyri herba</i> ) flavonoids (quercetin derivative, rutoside), phenolic acids, vitamin C vasoprotective; gently lowers blood pressure Essaven gel, Hemorigen femina, Kelicardina, Rutisol, VenoCorrector
38) <i>Polygonum aviculare</i> L.	Europe herb ( <i>Herba Polygoni avicularis</i> ) flavonoids (hyperoside, quercetin), phenolic acids (caffeic, chlorogenic), tannins anti-haemorrhagic, toning; cleansing the blood Herbatka fix Żyłaczek, Sklerosan
<i>Cactaceae</i> Juss.	
39) <i>Selenicereus grandiflorus</i> (L.) Brit. & Rose	Central and South America flowering stems favonoids (caccitin, rutin, quercetin-3-rutoside), hyperoside (hyperin or kemperrythrin), biogenic amines (tyramine, <i>N</i> -methyltyramine), dimethyl tyramine (hordenine), mucus, resin waxes, glycosides in the heart failure, heart weakness and atherosclerosis Strophanthus Comp.

<i>Theaceae</i> Mirb. ex Ker Gawl.					
40) <i>Camellia sinensis</i> (L.) O. Kuntze	China, India, Burma; cultivated	leaf ( <i>Folium Theae</i> )	alkaloids (caffeine, theobromine, theophylline), tannins, mineral salts, coumarins, flavonoids (quercetin, kaempferol), saponins and essential oils	regulates the content of substances that constrict and expand blood vessels – prevention of arterial hypertension; in large doses it increases blood pressure	Kraženie I Love Herbs
<i>Ericaceae</i> Juss.					
41) <i>Kalmia latifolia</i> L. (= <i>Chamaedaphne latifolia</i> (L.) Kuntze)	East part of North America	leaf ( <i>Folium Kalmiae</i> )	diterpenes (e.g. grayanotoxins), flavonoids, tannins, phytosterols (sitosterol), terpenes, phenolic glycosides (arbutin)	hypotensive; in hypertrophy and palpitations of heart	Strophanthus Comp.
42) <i>Oxycoccus palustris</i> Pers.	North and Central Europe, North Asia, North America	fruit ( <i>Oxycocci fructus</i> ), leaf ( <i>Oxycocci folium</i> )	tannins, anthocyanins, organic acids (citric, quinic, ursolic, benzoic); source of vitamin C	lowering blood pressure, astringent, vasoprotective	Colladen
43) <i>Vaccinium myrtillicum</i> L.	Europe, North America, southern Asia	fruit ( <i>Fructus Myrtillicum</i> ), leaf ( <i>Folium Myrtillicum</i> )	fruit – tannins, anthocyanins, proscyanidin, phenolic acids, ursolic acid; leaf – tannins, glycosides (arbutin), flavonoids, quinolizidine alkaloids, phenolic acids, triterpenes	astrigent, vasoprotective	Bilberin, Colladen, Herbatka fix Żylaczek, Várixinal
<i>Rubiaceae</i> Juss.					
44) <i>Galium odoratum</i> (L.) Scop.	Europe, South Africa	herb ( <i>Herba Asperulae</i> )	coumarins, flavonoids, organic acids, tannins, vitamin C	sedative, anti-inflammatory, relaxant; improves blood circulation, lowers blood clotting	Herba Asperulae

Plants supporting the treatment of cardiovascular diseases

<i>Loganiaceae</i> R. Br. ex Mart.					
45) <i>Spigelia anhelmia</i> L.	Antilles and South America	herb	alkaloids: isoquinoline and actinidine-type alkaloid	cardiotonic properties; accelerates the heart rate, reduces heart rhythm disturbances	<i>Strophanthus</i> Comp., Heel cralonin krople
<i>Apocynaceae</i> Juss.					
46) <i>Rauwolfia serpentina</i> (L.) Benth.	southern and south-eastern Asia	root ( <i>Radix Rauwolfiae</i> )	indole alkaloids (ajmaline, reserpine), phytoosterols	sedative, hypotensive, anti-arrhythmic: in cardiac arrhythmias, palpitations and atrial fibrillation, diastolic	Serpina
47) <i>Strophanthus gratus</i> (Wall. & Hook.) Baill.	western Africa	seed ( <i>Semen Strophanthii grati</i> )	strophanthin G (uabain) and K (combetin)	cardiac: anti-arrhythmic, strengthens and improves the activity of the heart muscle	<i>Strophanthus</i> Comp.
48) <i>Vinca minor</i> L.	Europe, Asia	herb ( <i>Herba Vincæ minoris</i> )	indole alkaloids (vincamine, vincinine, vincaminorin), flavonoids, anthocyanins, triterpenes, tannins, vitamin C	anti-haemorrhagic, hypotensive, diastolic; dilates peripheral vessels and strengthens the heart function	Barwinek pospolity ( <i>Vinca minor</i> )
<i>Solanaceae</i> Juss.					
49) <i>Atropa belladonna</i> L.	Europe, Asia Minor, North Africa and America	herb ( <i>Herba Belladonnae</i> ), leaf ( <i>Belladonnae folium</i> ), owoce ( <i>Fructus Belladonnae</i> ), root ( <i>Radix Belladonnae</i> )	tropane alkaloids (atropine, hyoscyamine, scopolamine), belladonnine, coumarins, flavonoids, tannins	diastolic; speeds up the heart rate	Hemorol

<i>Oleaceae</i> Juss. ex R. Br.					
50) <i>Olea europaea</i> L.	Europe, Africa, Asia; cultivated	leaf ( <i>Folium Oleae</i> )	phenolics (oleuropein, hydroxytyrosol), flavonoids (luteolin, rutin), quinoline alkaloids	anti-atherosclerotic, anti-thrombotic; improving blood flow in the coronary vessels	Liść Oliwny
<i>Lamiaceae</i> Martinov (= <i>Labiatae</i> Juss.)					
51) <i>Betonica officinalis</i> L.	Europe, North Asia	herb ( <i>Herba Betonicae</i> ), leaf ( <i>Folium Betonicae</i> )	tannins, phenolic acids, flavonoids, choline, vitamin C	anti-inflammatory, astringent, anti-haemorrhagic, increasing blood clotting	Herba Betonicae
52) <i>Leonurus cardiaca</i> L.	Europe, Asia, North America (temperate zone)	herb ( <i>Leonuri cardiaca herba</i> )	cardiac glycosides, alkaloids (stachydrine, leonurin, concreteicine, furicin), phenylpropanoids (leonoside A, B), flavonoids (quercetin, kaempferol, apigenin), anthocyanins, tannins, fitosterols, ursolic acid, choline	cardiac, hypotensive, tonic, sedative, diastolic, regulates the work of the heart	Cardiosan, Tabletki tonizujące
53) <i>Melissa officinalis</i> L.	Mediterranean area	leaf ( <i>Melissae folium</i> )	terpenoids (citral, linalool, citronellal), tannins, phenolic acids (caffeic, rosemary, ferulic acid), triterpenes, flavonoids, vitamin C	sedative, hypotensive, anti-spasmodic; in arrhythmias or cardiac neurosis	Cardio farm, Cravisol, Doppel Herz Vital, Nervosan fix, Nervosol, Neurosin Tea, Plusz gold vital, Tabletki tonizujące

Plants supporting the treatment of cardiovascular diseases

54) <i>Rosmarinus officinalis</i> L.	Mediterranean area	leaf ( <i>Rosmarini folium</i> ), olejek ( <i>Rosmarini oleum</i> )	essential oil (borneol, limonen, camphor), flavonoids, tannins, rosmarinic acid, saponins, phytoosterols	anti-spasmodic, tonic, anti-atherosclerotic; dilates capillaries and stimulates blood circulation	Plusz gold vital, Cardiactiv, Essaven gel
<i>Asteraceae</i> Bercht. & J. Presl (= <i>Compositae</i> Giseke)					
55) <i>Achillea millefolium</i> L. s.s.	Europe, Asia, North America, Australia and New Zealand	herb ( <i>Millefolii herba</i> ), kwiatostan ( <i>Millefolii flos</i> ), leaf ( <i>Millefolii folium</i> )	essential oil (chamazulene, achillein, betaine), sesquiterpenes, flavonoids, choline, tannins	anti-haemorrhagic, anti-spasmodic, hypotensive; in the treatment of varicose veins and haemorrhoids	Hemorigen femina, Hemorol, Nervosan fix, Nervosol, Rektosan, Sklerosan
56) <i>Arnica montana</i> L.	Central Europe, Asia and North America	inflorescence ( <i>Arnicae flos</i> )	sesquiterpenes (arnicolides A, B, C and D, helenalin), polyphenols (cynarin, caffeic acid), flavonoids (astragaline, isoquercetin), triterpenes, carotenoids, phytoosterols	anti-inflammatory, cardiac, anti-edema, anti-coagulant, vasoprotective, increases blood pressure	Arcalen, Arnical żel, Strophanthus Comp. Tinctura Arnicae, Venoczar żel, Venoforton, Venosol Bonifraters
57) <i>Calendula officinalis</i> L.	Mediterranean area; cultivated	inflorescence ( <i>Calendulae flos</i> )	triterpene saponins, carotenoids, flavonoids, coumarins (scopoletin, esculetin)	vasoprotective, anti-edema, reduces the permeability and fragility of capillaries	Arcalen, Masć nagietkowa, Venoczar żel, Venol, Venosol Bonifraters
58) <i>Chamomilla recutita</i> (L.) Rauschert	Europe, Asia, North America, Australia	inflorescence ( <i>Matricariae flos</i> )	essential oil (chamazulene, $\alpha$ -bisabolol), flavonoids (apigenin, quercetin, paluletin), coumarins (umbelliferone), choline, vitamin C	diastolic; used as an auxiliary in haemorrhoids	Aesculan, Hemorol, Herbatka fix Żylaczek, Neo-aesculan żel, Nervosan fix, Neurosin Tea, Venol
59) <i>Conyza canadensis</i> (L.) Cronquist	cosmopolitan	herb ( <i>Herba Erigerontis canadensis</i> )	flavonoids (rutoside), phenolic acids (caffeic, ferulic), tannins, phytoosterols, vitamin C	astringent, anti-haemorrhagic	Hemorigen femina



60) <i>Cynara scolymus</i> L.	Ethiopia; cultivated in the Mediterranean, North Africa and America	herb ( <i>Cynara herba</i> ), leaf ( <i>Cynara folium</i> )	cynarin, caffeic and chlorogenic acid, cynaropicrin, flavonoids, phytosterols	anti-atherosclerotic; lowers cholesterol and lowers the content of lipids in the blood	Cynarex, Sylicynar
<i>Araliaceae</i> Juss.					
61) <i>Panax ginseng</i> C.A. Meyer and <i>P. quinquefolius</i> L.	cultivated in Asia and North America	root ( <i>Ginseng radix</i> , <i>Ginseng extractum siccum</i> )	triterpene saponins (ginsenosides), alcohols (panaxidol, panaxinol, falkarinol), flavonoids, amino acids, choline	anti-atherosclerotic, strengthening the heart muscle; increases blood pressure	Bodymax plus, Ginkogins, Ginselin, Żeń-szeń vita complex
<i>Apiaceae</i> Lindl. (= <i>Umbelliferae</i> Juss.)					
62) <i>Ammi visnaga</i> (L.) Lam.	Mediterranean area; introduced to Central and northern Europe	fruit ( <i>Ammi visnagae fructus</i> )	pyranocoumarins (visnadin, samidine), furanochromone derivatives (kelin, visnagine), flavonoids, phenolic acids, sterols	diastolic, dilates blood vessels; used in coronary artery disease, in pre- and post-infarction conditions	Kellicardina, Tinctura Ammi visnagae
63) <i>Centella asiatica</i> (L.) Urb.	South and Central Asia and Africa, Australia, South and Central America	herb ( <i>Centellae asiaticae herba</i> )	triterpene saponins (asiaticoside, madecassoside, centelloside, scepholeoside) and acids (asiatic, centelic), monoterpenes, sesquiterpenes, polyacetylene compounds, flavonoids	hypertension, peripheral circulation and elasticity of blood vessels – in atherosclerosis	Ruscoven plus, Varixinal, VenoCorector

Plants supporting the treatment of cardiovascular diseases

<i>Caprifoliaceae</i> Juss.					
64) <i>Sambucus nigra</i> L.	Europe, western and Central Asia	root ( <i>Radix Sambuci</i> ), cortex ( <i>Cortex Sambuci</i> ), leaf ( <i>Folium Sambuci</i> ), flower ( <i>Flos Sambuci</i> ), fruit ( <i>Fructus Sambuci</i> )	flavonoids, phenolic acids (caffeic and chlorogenic acid), tannins, mucilages	vasoprotective, supports microcirculation	Syrop malina z kwiatem bzu czarnego z witamina C; juices and decoctions of flowers and dried fruit
<i>Valerianaceae</i> Batsch					
65) <i>Valeriana officinalis</i> L.	Europe, Asia, North America.	root ( <i>Radix valerianae</i> )	terpene alkaloids (valerine, scintantin, actimidine), iridoids, essential oil (valeric acid, bormeol, isoeugenol)	relaxing, diastolic; in arrhythmias or cardiac neurosis	Cardiol C, Cardiotonic, Extraspazmina, Neocardina, Neospasmina, Nervosan fix, Nervosol, Passispasmina

**Tab. 3.** List of plants with a therapeutic effect in cardiovascular diseases

Healing action	List of species	Number of species
generally cardiac	<i>Adonis vernalis</i> , <i>Arnica montana</i> , <i>Convallaria majalis</i> , <i>Crataegus laevigata</i> , <i>C. monogyna</i> , <i>Hibiscus sabdariffa</i> , <i>Kalmia latifolia</i> , <i>Leonurus cardiaca</i> , <i>Strophanthus gratus</i> , <i>Styphnolobium japonicum</i> , <i>Urginea maritima</i> , <i>Viscum album</i>	12
strengthening the heart muscle	<i>Adonis vernalis</i> , <i>Ammi visnaga</i> , <i>Camellia sinensis</i> , <i>Convallaria majalis</i> , <i>Ophiopogon japonicus</i> , <i>Panax ginseng</i> , <i>P. quinquefolius</i> , <i>Passiflora incarnata</i> , <i>Rosa canina</i> , <i>Rubus</i> sp., <i>Sarothamnus scoparius</i> , <i>Selenicereus grandiflorus</i> , <i>Strophanthus gratus</i> , <i>Urginea maritima</i> , <i>Vinca minor</i> , <i>Vitis vinifera</i>	16
anti-arrhythmic	<i>Adonis vernalis</i> , <i>Convallaria majalis</i> , <i>Rauvolfia serpentina</i> , <i>Sarothamnus scoparius</i> , <i>Strophanthus gratus</i> , <i>Spigelia anthelmia</i> , <i>Urginea maritima</i>	7
anti-atherosclerotic	<i>Allium sativum</i> , <i>A. ursinum</i> , <i>Bambusa arundinacea</i> , <i>Centella asiatica</i> , <i>Cynara scolymus</i> , <i>Fucus vesiculosus</i> , <i>Equisetum arvense</i> , <i>Olea europaea</i> , <i>Panax ginseng</i> , <i>P. quinquefolius</i> , <i>Rosmarinus officinalis</i> , <i>Selenicereus grandiflorus</i> , <i>Sorbus aucuparia</i> , <i>Vitis vinifera</i>	14
anti-coagulants	<i>Allium sativum</i> , <i>A. ursinum</i> , <i>Arnica montana</i> , <i>Betonica officinalis</i> , <i>Ginkgo biloba</i> , <i>Melilotus officinalis</i> , <i>Olea europaea</i> , <i>Ophiopogon japonicus</i> , <i>Salix</i> sp., <i>Styphnolobium japonicum</i>	10
anti-edema	<i>Aesculus hippocastanum</i> , <i>Arnica montana</i> , <i>Calendula officinalis</i> , <i>Melilotus officinalis</i> , <i>Ophiopogon japonicus</i> , <i>Ruscus aculeatus</i> , <i>Ruta graveolens</i>	7
anti-haemorrhagic	<i>Achillea millefolium</i> , <i>Aesculus hippocastanum</i> , <i>Bambusa arundinacea</i> , <i>Betonica officinalis</i> , <i>Capsella bursa-pastoris</i> , <i>Conyza canadensis</i> , <i>Equisetum arvense</i> , <i>Hamamelis virginiana</i> , <i>Polygonum aviculare</i> , <i>Potentilla erecta</i> , <i>Urtica dioica</i> , <i>Vinca minor</i>	12
anti-spasmodics	<i>Melissa officinalis</i> , <i>Rosa canina</i> , <i>Rosmarinus officinalis</i>	3
diastolic	<i>Achillea millefolium</i> , <i>Ammi visnaga</i> , <i>Atropa bella-donna</i> , <i>Chamomilla recutita</i> , <i>Cola nitida</i> , <i>C. acuminata</i> , <i>Crataegus laevigata</i> , <i>C. monogyna</i> , <i>Galium odoratum</i> , <i>Leonurus cardiaca</i> , <i>Potentilla erecta</i> , <i>Rauvolfia serpentina</i> , <i>Ruta graveolens</i> , <i>Urtica dioica</i> , <i>Vinca minor</i>	15
anti-hypertensive (lowering blood pressure)	<i>Achillea millefolium</i> , <i>Allium sativum</i> , <i>A. ursinum</i> , <i>Aronia melanocarpa</i> , <i>Camellia sinensis</i> (small doses), <i>Centella asiatica</i> , <i>Crataegus laevigata</i> , <i>C. monogyna</i> , <i>Fagopyrum esculentum</i> , <i>Fucus vesiculosus</i> , <i>Hibiscus sabdariffa</i> , <i>Kalmia latifolia</i> , <i>Leonurus cardiaca</i> , <i>Melissa officinalis</i> , <i>Oxycoccus palustris</i> , <i>Passiflora incarnata</i> , <i>Rauvolfia serpentina</i> , <i>Ruta graveolens</i> , <i>Urtica dioica</i> , <i>Valeriana officinalis</i> , <i>Vinca minor</i> , <i>Viscum album</i>	22
hypertensive (raising blood pressure)	<i>Arnica montana</i> , <i>Camellia sinensis</i> (large doses), <i>Citrus aurantium</i> , <i>Cola nitida</i> , <i>C. acuminata</i> , <i>Panax ginseng</i> , <i>P. quinquefolius</i> , <i>Sarothamnus scoparius</i> ,	8
vasoprotective (protect the structure of blood vessels)	<i>Aesculus hippocastanum</i> , <i>Arnica montana</i> , <i>Bambusa arundinacea</i> , <i>Calendula officinalis</i> , <i>Centella asiatica</i> , <i>Citrus aurantium</i> , <i>Citrus limon</i> , <i>Crataegus laevigata</i> , <i>C. monogyna</i> , <i>Fagopyrum esculentum</i> , <i>Ginkgo biloba</i> , <i>Malpighia glabra</i> , <i>Ophiopogon japonicus</i> , <i>Oxycoccus palustris</i> , <i>Ribens nigrum</i> , <i>Rubus</i> sp., <i>Ruscus aculeatus</i> , <i>Ruta graveolens</i> , <i>Salix</i> sp., <i>Sambucus nigra</i> , <i>Styphnolobium japonicum</i> , <i>Vaccinium myrtillus</i> , <i>Viola tricolor</i>	23
toning	<i>Leonurus cardiaca</i> , <i>Polygonum aviculare</i> , <i>Rosa canina</i> , <i>Rosmarinus officinalis</i> , <i>Urtica dioica</i> , <i>Viola tricolor</i>	6
astrigent (causing the blood vessels to contract)	<i>Betonica officinalis</i> , <i>Capsella bursa-pastoris</i> , <i>Conyza canadensis</i> , <i>Hamamelis virginiana</i> , <i>Oxycoccus palustris</i> , <i>Potentilla erecta</i> , <i>Ribens nigrum</i> , <i>Sorbus aucuparia</i> , <i>Vaccinium myrtillus</i>	9

## Rośliny wspomagające leczenie chorób układu krwionośnego

## Streszczenie

Choroby układu sercowo-naczyniowego należą do grupy chorób cywilizacyjnych odpowiedzialnych za główną część zgonów na świecie. W leczeniu i zapobieganiu tym chorobom stosuje się liczne leki i preparaty, w tym zawierające substancje roślinne, po które szczególnie chętnie sięgają pacjenci we wczesnych stanach chorobowych. Na rynku obecnych jest wiele preparatów roślinnych dostępnych bez recepty. Celem opracowania było sporządzenie wykazu systematycznego roślin, które są stosowane powszechnie przez pacjentów przy leczeniu i suplementacji różnych schorzeń związanych z układem krwionośnym. Na podstawie 100 preparatów dostępnych w aptekach lub sklepach zielarskich bez recepty w Polsce sporządzono wykaz gatunków roślin, które scharakteryzowano pod kątem ich pochodzenia, rodzaju surowca zielarskiego, składów chemicznych i właściwości leczniczych wykorzystywanych w chorobach krążenia. Sporządzony wykaz systematyczny obejmuje 65 gatunków, głównie roślin naczyniowych. Najbardziej powszechnym surowcem stosowanym w preparatach dostępnych na rynku jest *Crataegus* sp., *Aesculus hippocastanum* oraz *Ruscus aculeatus*. Większość odnotowanych tu roślin wykazuje działanie wazoprotekcyjne (np. *Ginkgo biloba*, *Ophiogon japonicus*, *Ruscus aculeatus*, *Ribes nigrum*), obniża ciśnienie tętnicze krwi (np. *Aronia melanocarpa*, *Fucus vesiculosus*, *Passiflora incarnata*), działa rozkurczająco (np. *Leonurus cardiaca*, *Polygonum aviculare*). Lista systematyczna obejmuje 23 gatunki roślin rodzimych dla Europy środkowej, natomiast substancje roślinne otrzymywane z 20 gatunków sprowadzane są z różnych obszarów świata.

**Keywords:** blood vessel and heart diseases, dietary supplements, herbal therapies

**Received:** [2021.09.10]

**Accepted:** [2021.11.17]