

PHYTOTHERAPY – HISTORY AND MODERN USE, EXAMPLES OF APPLICATION IN TREATMENT AND EVERYDAY PRODUCTS

ФІТОТЕРАПІЯ – ІСТОРІЯ ТА СУЧАСНЕ ВИКОРИСТАННЯ, ПРИКЛАДИ ЗАСТОСУВАННЯ В ЛІКУВАЛЬНИХ ТА ПОВСЯКДЕННИХ ПРОДУКТАХ

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Summary

Since the beginning of human race, people have used plants as the source of nourishment. Plants are made of proteins, fatty acids and carbohydrates; they contain mineral salts and other kinds of substances such as vitamins. All of the plant compounds are well known to modern science due to technology development and possibility of performing the experiments. However, our accents could only depend on good luck and observe themselves after use of unknown plant. The knowledge about positive effects after the usage of plant extracts or their consumption were cherished and passed down to next generations. The prescriptions for home-made remedies for rheumatism, different kinds of pain, wounds etc. were always present in people's life next to plant use in food preparation as spice or medical tinctures. There are certain experiments which showed that plants are very complex organisms. After many years of scientific research, it has been finally discovered what is responsible for making some plants beneficial for human and animal health or dangerous and toxic in other cases. These days, biochemical characters of plant properties do not pose any secret to people who are conscious of the advantages resulting from using them every day. Particularly every cosmetic product contains some secondary metabolites or plant extracts, which provide certain results in everyday body care. When it comes to night creams, certain chemical peeling and face gels plant enzymes should be mentioned. The positive activity of these creams is connected with skin regeneration processes. Flaking is obstructed by the enzymes which are able to degrade dead skin cells. This process may cause new cells' activation, which will replace dead skin cells. Such a reaction triggered by enzymes is used in treatment of scars, as well as in the prevention of skin aging. The effectiveness of the herbal therapy is found in substances high in biological activities. Herbs and their products of metabolism can be used in medical treatment of numerous conditions such as indigestion disorders starting from malnutrition and ending with obesity. In case of cardiac failure the most important remedies are heart medicaments.

Keywords: phytotherapy, development, cells, anatomy.

З початку людської раси люди використовували рослини як джерело живлення. Рослини складаються з білків, жирних кислот і вуглеводів; вони містять мінеральні солі та інші види речовин, такі як вітаміни. Всі рослинні сполуки добре відомі сучасній науці завдяки розробці технологій та можливості проведення експериментів. Однак наші акценти могли залежати лише від удачі та спостереження за собою після використання невідомої рослини. Знання про позитивні ефекти після використання рослинних екстрактів або їх споживання були заповітними і передавалися наступним поколінням. Рецепти домашніх засобів від ревматизму, різного роду болю, ран тощо були завжди в житті людей поруч із використанням рослин у приготуванні їжі як прянощів або лікувальних настоянок. Існують певні експерименти, які показали, що рослини є дуже складними організмами. Після багатьох років наукових досліджень було остаточно виявлено, що відповідає за те, що роблять деякі рослини корисними для здоров'я людини і тварин або небезпечними та токсичними в інших випадках. У наші дні біохімічні властивості рослинних властивостей не створюють жодної таємниці для людей, які усвідомлюють переваги, що виникають при їх щоденному використанні. Зокрема, кожен косметичний продукт містить деякі вторинні метаболіти або рослинні екстракти, які забезпечують певні результати у повсякденному догляді за тілом. Що стосується

нічних кремів, слід згадати певні хімічні пілінги та гелі для обличчя, рослинні ферменти. Позитивна активність цих кремів пов'язана з процесами регенерації шкіри. Луценню заважають ферменти, здатні деградувати мертві клітини шкіри. Цей процес може спричинити активацію нових клітин, що замінить мертві клітини шкіри. Така реакція, спричинена ферментами, використовується для лікування рубців, а також для профілактики старіння шкіри. Ефективність фітотерапії виявляється у речовинах, що мають високу біологічну активність. Трави та продукти їх метаболізму можуть бути використані для лікування багатьох захворювань, таких як розлад травлення, починаючи від недоїдання і закінчуючи ожирінням. У разі серцевої недостатності найважливішими засобами є серцеві ліки.

Ключові слова: фітотерапія, розвиток, клітини, анатомія.

С начала человеческой расы люди использовали растения в качестве источника питания. Растения состоят из белков, жирных кислот и углеводов; они содержат минеральные соли и другие виды веществ, такие как витамины. Все растительные соединения хорошо известны современной науке благодаря разработке технологий и возможности проведения экспериментов. Однако наши акценты могли зависеть только от удачи и наблюдения за собой после использования неизвестного растения. Знания о положительных эффектах после использования растительных экстрактов или их потребления были заветными и передавались следующим поколениям. Рецепты домашних средств от ревматизма, разного рода боли, ран и т.д. были всегда в жизни людей рядом с использованием растений в приготовлении пищи как пряностей или лечебных настоек. Существуют определенные эксперименты, которые показали, что растения являются очень сложными организмами. После многих лет научных исследований было окончательно установлено, что отвечает за то, что делают некоторые растения полезными для здоровья человека и животных или опасными и токсичными в других случаях. В наши дни биохимические свойства растительных веществ не создают никакой тайны для людей, которые осознают преимущества, возникающие при их ежедневном использовании. В частности, каждый косметический продукт содержит некоторые вторичные метаболиты или растительные экстракты, которые обеспечивают определенные результаты в повседневном уходе за телом. Что касается ночных кремов, следует вспомнить определенные химические пілінги и гели для лица, растительные ферменты. Положительная активность этих кремов связана с процессами регенерации кожи. Шелушению мешают ферменты, способные деградировать мертвые клетки кожи. Этот процесс может привести к активации новых клеток, заменит мертвые клетки кожи. Такая реакция, вызванная ферментами, используется для лечения рубцов, а также для профилактики старения кожи. Эффективность фитотерапии оказывается в веществах, обладающих высокой биологической активностью. Травы и продукты их метаболизма могут быть использованы для лечения многих заболеваний, таких как расстройство пищеварения, начиная от недоедания и заканчивая ожирением. В случае сердечной недостаточности важнейшими средствами являются сердечные лекарства.

Ключевые слова: фитотерапия, развитие, клетки, анатомия.

Introduction. For many experiments this traditional knowledge was the base for the beginning of discovery what is the reason which makes a specific plant so special. Finally, people could look into plant cells, proceed with biochemical experiments, determine the structure of chemical substances, but also observe plants and describe specific role of their compounds.

These experiments showed that plants are more complex organisms than human could imagine. Next to the basic forms scientists proved that plants produce other kinds of substances described as secondary metabolites. After all these years people finally discovered what is responsible for making some plants beneficial for human and animal health or dangerous and toxic in other cases.

Today, the big tendency of returning to nature is popular. After years of use of synthetic forms in cosmetics, products for food storage, production of overwhelming amounts of pollution people are becoming more conscious about the environment, and dangers of destroying the

nature. Some of those people, because of health or ideological reasons, are resuming to traditional products used by our grandparents and older generations. Cosmetic products are produced with the use of naturally obtained active substances. People are more aware of quality of different kinds of food, they pay bigger attention to a composition of products, purchase products in trusted shops, read more about beneficial aspects of spices and home-made one-compound products [1].

Natural plant substances are becoming more popular. Many of the substances are well described, but many more have yet to be tested. Nonetheless, there are many examples of beneficial natural products which can be used safely. The branch of knowledge which is focused on use of plants for medical purposes and supplementation of diet is called phytotherapy, also known as herbalism [1].

Phytotherapy seems to be an indispensable element of human life. First, people discovered the properties of plants with time. Because of

nomadic existence people, mainly women, were harvesting plants. They searched through wild plants with children in search of good and safe food. Because women were also responsible for preparing meals, taking care of sick and wounded, they needed knowledge of plants with medical properties [2].

Many historical sources show deep connection between herbalism and religion, magic and other superstitions. Herbs were used in traditional rituals, they were believed to represent powers of nature and specific deity, and many were thought to be sacred plants. Sacred plants usually had specific properties, which made them special to people. Some of them had narcotic factors, like different species of mushrooms. They were often used in rituals in order to achieve trance, which made the possibility to connect with gods. In China people cherished ginseng, in Polish culture one of the most prominent was St. John's wort. In European culture tropical plants were often named as „gifts from the God” such as cocoa tree, tea, guarana and tree of cola. One of the more recognizable plants is mandrake which is mentioned in the Bible [2].

Nowadays, people are more aware of biochemical nature of plant properties, which gives the opportunity of using them in everyday life. Practically every cosmetic product contains plant extracts or secondary metabolites, which provide specific effects in body care. The most popular ingredients are oils. They provide protection from dehydration and protect natural layer of skin oils from mechanical damage. Plant oils are mainly fluid and they are acquired from different parts of plants, such as fruit, seeds, sprouts etc. The most beneficial oils are acquired with cold-pressed technique, which provides the protection of precious particles, which could be easily destroyed with high temperatures [2].

Oils are present in meal preparation, but also in cosmetic production. Plant oils often belong to drying, what makes them perfect products in skin care, because they do not leave greasy layer, what makes them favoured among other kinds of oils. They are popular in hair care. As in the case of skin, hair is covered by thin layer of oils, which provides the accumulation of water.

Different kinds of oils are preferred by different types of skin and hair. For oily skin easily drying and light oils are recommended, for dry and sensitive skin – rich oils, which provide

nourishment and even last as protective layer for longer time.

The use of oils in skin and hair care is very beneficial for its health. Oils provide proper accumulation of water, which makes skin more elastic and resistant to mechanical damage. They are plenty of them used in face creams, body creams, hair masks and even shampoos. In cosmetics, oils make up to a couple percent of product volume. This may cause their unnoticeable impact on tissue condition. To achieve their full beneficial potential they can be applied directly to the skin or hair with or without other ingredients. These oils are flax oil, watermelon oil, olive oil, argan oil, jojoba oil etc. Other kinds of oil have high concentration of beneficial ingredients. For example, strawberry oil contains many unsaturated fats that are why its proposed concentration in skin care products is between 10 to 20 %, in form of active substance. Strawberry oil contains antioxidants and tocopherols, which protect skin from reactive forms of oxygen, responsible for hastening the aging process. Lately, one of the most popular oils is raspberry oil. Its production is very expensive, because from large amounts of fruits only few litres of oil are obtained. Its special properties resulted from high concentration of vitamins A and E, which are appreciated in skin care for many years. Also, it has anti-inflammatory influence on skin, what makes it helpful in acne recovering, skin damage and scar brightening [3].

Plant butters comprise another group of oils also popular in skin care. One of the most popular butter in cosmetic industry is shea butter. Plant butter is in solid-state in room temperature. Some of them can be warmed up and dissolved with heat, other need to be put in higher temperature. Butter oils are most beneficial from cold-pressed method, like plant oils.

Shea butter contains allantoin, which is helpful in inflammation treatment, regeneration of skin tissue, provides proper hydration and makes skin smooth in touch. It also has vitamins F and E and pro-vitamin A, also engaged in skin rejuvenation process. It has natural UV protection factor on low level and can be used to every skin type [3].

The most expensive plant oil in the world is oil of *Opuntia ficus-indica*, often called a *botox in the bottle*. The plant is a species of a cactus and is economically important in arid and semi-arid

parts of the world. To obtain one litre of opuntia oil it is needed to use up to approximately 500 kg of fruits, which equals one million of seeds. The oil production is time-consuming and ineffective. Opuntia oil is rich in vitamin E, phytosterols and unsaturated oils. It protects skin of reactive forms of oxygen and damage caused by UV light.

In night creams, chemical peelings and face gels plant enzymes are often added. Their activity is used in skin regeneration process. Enzymes are able to degrade dead skin cells, which cause their flaking. This provides activation of new cells, which substitute dead cells. The reaction catalysed by enzymes is used in treatment of scars, also in prevention of skin aging. Skin is constantly engaged in self-modulation process. That is why plant enzymes are popular in skin care [4].

Popular enzymes used in facial exfoliations are collected from fruit. Bromelain is an enzyme extract derived from pineapple stems. It is a specific mixture of proteolytic enzymes. This property makes bromelain useful in skin care, because its components can dissolve dead cells of epidermis. Also, this mixture in enzymes can be used in wound or scar treatment, anti-cellulite creams. As a medicine, bromelain is efficient in treatment of joints inflammation.

Another enzyme, papain, is present in leaves and fruits of papaya. Its activity mechanism is similar to bromelain. Papain is also a proteolytic enzyme and can successfully be used in creams and home-made remedies for skin cleaning [4].

On the other hand, not only enzymes can be efficient as a skin exfoliator. Enzymes are used in chemical peelings, which are recommended for sensitive skin, which is easily flushing. In their preparation the most important enzyme is concentration. Without proper knowledge it is very easy to cause severe damage. In this case mechanical exfoliators are safer to use, such as strawberry seeds or chokeberry seeds. Ground coffee seeds are popular in body scrubs. Coffee seeds contain caffeine and antioxidants. These compounds have positive influence on skin condition, and with additional mechanical massage it can improve skin appearance. This shows that not only plant extracts can be used in phytotherapy, but also some parts of plant organisms can be applied. Plants are producing secondary metabolites - organic compounds of plants, which are not engaged directly in process of growth,

reproduction or development. Their absence usually is not lethal for plants, but may cause impairment of the solvability, immunity to pathogens and parasites or attractiveness to insects. Secondary metabolites are used by human in medicine production, flavourings, but also in aromatherapy [3].

Essential oils are one of the plant secondary metabolites. They are concentrated liquids which contain aroma forms. For plants, they are the way of communication with insects and animals. Specific aroma can be attractive for bees, which allows the pollen transport between different plants. In other cases, aroma can be found by animals as irritating, what protects the plant organism from damage made by feeding animals [4].

Essential oil is used in perfume production. They are rich in essential fatty acids and they contain the specific fragrance of the plant. They are usually extracted by distillation with use of hot steam. Other techniques include expression, rasin taping, cold pressing etc. The technique is adjusted to the material, from which the essential oils can be obtained. Essential oils are the mixture of different compounds. Nowadays, approximately 1700 substances were identified as components of essential oils. They include terpenoids, such as limonene or geraniol – popular additive in cosmetics, derivatives of alcohols and aldehydes with short carbon chain, ketones and derivatives of benzene. In plants, essential oils are produced in every part of a singular organism. Depending on the localisation of the plant they play different functions. Those oils which produced by flowers and fruit attract insects, which are responsible for pollen transportation [4].

Essential oils are also commonly used in aromatherapy. This therapeutic method uses special properties of aromatic compositions. It is well known to human being since centuries; nowadays it is getting more and more popular all over the world. Systematic use helps in maintaining physical and mental well-being. Essential oils are said to be influential on limbic system, through olfaction; furthermore, the content of biologically active substances is beneficial [4].

The term *aromatherapy* was used in XX century for the first time, but the method was well known much earlier. The use of aromatic properties of essential substances was first mentioned in 1500 BC. In Egypt people used oils of mint pepper, cinnamon, grow barren or olbanum, the

properties of herbs and plants were also known in ancient China. In India essential oils were used in rituals, medicine and everyday life, similarly to Greece or ancient Rome [4].

Aromatherapy can be used in different ways, which depend on the expected results and specific malady. Essential oils can be inhaled in order to cure respiratory system diseases, such as rhinorrhoea or cough. They can be applied to skin, where they are absorbed by surface of the skin or used during baths, where results are similar. Essential oils can be applied in forms of compresses or used during massage [4]. Essential oils can be successfully used in body care. Tea tree oil is popular in treatment of acne and skin lesions, but also as additive to shampoos, because of its antibacterial properties. Lavender oil helps in cleansing the airways; chamomile oil helps in inflammation treatment and in case of skin disease and not well healing wounds. In cosmetic products essential oils are usually only a little compound, they are responsible for giving the product a specific scent, but they can be used in home remedies [2].

The other product obtained during essential oil extraction is herbal distillate, also known as herbal water, hydrosol, better known as hydrolate. They are aqueous products of hydrodistillation and are obtained with essential oils in form of water fraction of extract. Hydrolates are colloidal suspensions of essential oils and water-soluble components of plants. The concentration of essential oil in herbal water is usually less than 1 %. Formerly, they were thought to be a redundant product of oils extraction, nowadays their gaining popularity in skin care and even food preparation [4].

As skin care products hydrolates are very popular as self-contained products and their pH is similar to physiological pH of skin; they prevent skin dehydration and give the effect of relaxed and refreshed skin. They can be used in face or hair masks, as additive in face creams or added during bath. In some houses hydrosols are in form of eye or ear drops. They can be used as spice or drink ingredient [3].

Hydrosols are beneficial for skin health because of their antibacterial and anti-inflammatory properties. Hydrosol of mint gives refreshing feeling to the skin. Hydrolate of salvia helps to sanitize skin; chamomile hydrolate is used in acne treatment and has sedative activity [3].

Herbs and plant extracts are used not only in cosmetology and self-care products. Their most important role is positive influence on health, supporting the immune system, defending the body from bacteria, supporting the regeneration of damaged tissues etc. Plants are rich in active substances, which can be used in medical products. There are many plants, which are known for their specific properties since ages. They are still present in modern products, with many new, well recognised products due to technology development. Furthermore, active substances are thought to be more effective than synthetic ones. Vitamins, microelements obtained and absorbed from natural sources are better metabolised by organisms. This is the main reason, why plants and their natural extracts will be present in medications and in preventive treatment for long time [3].

Nowadays it is well known that proper supplementation in micro- and macro elements is crucial in functioning of the organism. Also, an excess and deficiency of certain elements can enforce physiological and biochemical changes in the body, which can lead to weakening of the organism and illnesses. The development of analytic techniques provided the information about physiological and pathological role of certain microelements. Their concentration in herbs can have positive or negative influence on medical properties [3].

The results depend on the amount and chemical character of applied substances, but also proportion of other microelements, which can be antagonistic or synergistic. Certain plants are to accumulate trace elements from natural environment. This property is used in herbalism since ages. The good example is field horsetail, which accumulates silicon, which in human body is important to create proper construction of cellular structures of connective tissue [4].

Herbs and their products of metabolism can be used in treatment of certain conditions. As mentioned earlier, plants produce secondary metabolites, which can be used in medical treatment of certain diseases. In case of cardiac failure the most important remedies are heart medicaments. Their compounds can be delivered from plants of foxglove or sea squill, which contain cardiac glycosides. Sea squills are believed to increase the output force and decrease a rate of heart contractions [3].

In treatment of respiratory system diseases the use of herbalism has time-honoured tradition. In diseases of lungs and bronchial tubes plant drugs can be used as auxiliary drugs, as supplement drugs or preventive medicine. They cannot be used in elimination of causes of the disease, but still can be helpful in symptom treatment. Plant therapeutics as cough suppressants and expectorants are widely used in treatment, despite accessibility of synthetic analogues. One of the most recommended cough suppressants is codeine, which is one of alkaloids of opium. Codeine has less psychotropic effects than morphine and is added to syrups, which stimulate or inhibit coughing and cause production of mucus [4]. Herbs are present in expectorants such as European wild ginger, leaves and roots of common marshmallow, fruits of anise, leaves of eucalyptus, flower of coltsfoot, flower of lavender and many more. All of them are used as infusions or are used as a compound of medicines [3].

In case of gastrointestinal tract malfunction the use of natural plant extracts is essential, because the variety and effectiveness of synthetic remedies is insufficient. Many patients suffer from activity malfunctions, which can be successfully treated by well-suited diet supplemented with plant products. Their effectivity is found in the proper content of substances with high biological activities, which are well recognised by the human body. In treatment of gastrointestinal affliction herb ingredients play the main role such as essential oils, mineral salts, vitamins, tannins, organic acids, alkaloids and many other substances which support proper process of digestion, absorption and excretion. In case of inflammation of oesophagus reflux, plants with protective properties such as flower of *Alcea nigra*, leaves of coltsfoot or common marshmallow can be useful. Decoctions made from these plants can be taken up to 4 times per day. Nowadays, people are returning to traditional ways of treatment. Specific mixtures of herbs can provide liver protection and ease digestion; some are popular as regular supplement. These herbs are mint, chamomile and rockrose. In case of diarrhoea the most useful are plants which provide anti-inflammatory, antipyretic, actinociceptive activity. In this case many herbs and plants can be used: oak bark, rhizome of *Potentilla* genus, leaves of common walnut and many more [4].

In digestion proper functioning of liver is

required. This organ is also engaged in distribution of nutritional components. Liver is conjugated with gastrointestinal and circulatory systems, its activity is crucial for proper functioning of other organs. On the other hand, chronic malfunction of gastrointestinal system can cause liver damage. That is why the most effective way of liver supplementation goes through digestive tract. Applied herbs cause detoxification; they are diuretic, anti-inflammatory, antibacterial and antiviral. They support synthesis and excretion of bile, digestive activity by regulation of gastric juice volume and peristalsis of intestines [3].

Phytotherapy can be efficiently applied in treatment of diseases from metabolic disorder spectrum. These conditions are connected to excess or deficiency of specific nutrients and do not involve eating disorders, such as anorexia, bulimia or orthorexia. Metabolic disorders can be a result of abnormal metabolism of peptides, hydrocarbons, lipids and other kinds of organic compounds, which cannot be properly digested and absorbed by organism. Diseases such as diabetes, sclerosis and obesity are diseases of affluence, which are currently a big social issue in developing countries. Malnutrition, on the other hand, is a condition widely spread in east developed countries [1].

Phytotherapy in malnutrition can be used as a remedy for appetite stimulation. Plants with this property contain substances with bitter taste, which activates taste buds and as a result stimulate bile and gastric juice production. In treatment with malnourished patients herbal preserves can be used, like those made from gentian root, St John's wort, wormwood or epicarp of bitter orange [1].

In treatment of obesity the main focus is on application proper amount of calories for patient. That equals major limitation of patients' habits. To provide the feeling of being full at the same time, when patient eats less, specific herbs can be used. Those plants contain mucilage, which is not digested or absorbed. Its role is to resorb water and ditto its volume in order to extend volume of entire digestive system contents. At the same time, mucilage is irritating nerve endings of mucous tissue, what provides stimulation of peristalsis and accelerates time of intestinal transit. Plant medicines with high concentration of mucilage are applied in form of jelly, gruel or as pellet. The most popular is agar obtained from algae, used

alone or with addition of herbs [3].

Furthermore, plants and their extracts can be applied in forms of compresses to the skin or area of muscle pain or joint pain. In cases of chronic illness, the supplementation also can be provided. As supplements the most important are herbs with high concentration of silica and various microelements, such as common horsetail. Silica is water-soluble, what makes it easily accessible for absorption in organisms. Silica can be a supportive factor during osteoporosis, also it is recommended to people over 50 to consumer certain amount of silica [3].

Plants can be effectively used in allergy treatments. Usually, allergies are acquired after several contacts with allergic substances. The system overreacts to the factor, what can be life threatening. All allergic reactions can be divided into two kinds: early reaction and immediate reaction, which are connected with the presence of antibodies in bloodstream, and late reaction, which depend on cell response to allergic factors [4].

Herbs can be used in treatment of mild asthma, between attacks, as preventive and supporting remedy. Plants with expectorant and anti-inflammatory properties are found very effective in these cases [3]. Hives is the reaction to alimentary allergens and medicaments. Its appearance is usually very sudden and it can localise on the on the all body or its certain parts. The disease can have chronic form, which continues for months or years with short breaks of improvement. Hives

can be also an alarming signal of coming anaphylactic shock, which can be life threatening. Plants, such as heartsease, knotgrass and motherwort, in mixture with various herbs can be used in treatment of hives [3].

Atopic dermatitis is a chronic allergic condition, which continuous for years, usually appears in young age. Symptoms are focused on skin lesion: red areas and itchiness, which appear on face, neck, in brooks of elbows and knees. Usually, atopic dermatitis is accompanied by other allergic diseases. The treatment is focused on pacifying sudden reaction of organism and easing skin lesions [1].

In use of phytotherapy the most important factor is regularity and self-observation. Many herbs have dedicated prescription or daily dosage. The most important is not to overdose these supplements and to take care of proper hydration, because herbs with all their beneficial properties can result in improper water level in organism [1].

As all the presented examples show – herbalism is still an active branch of knowledge, with very long tradition, which can be only enriched with modern technology. Nowadays, people are going back to natural remedies. At the time of global warming and pollution, human beings are returning to natural medicine, which is well recognised by organisms and more effectively absorbed than synthetic and chemical products.

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