The role of medicinal plants in the fight against chronic diseases: the example of tansy and yarrow

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Abstract: In the current context of increasing numbers of chronic diseases, there is growing interest in the use of natural remedies with proven therapeutic effects. Medicinal plants, which contain a wide range of biologically active substances, represent an important direction in the prevention and comprehensive treatment of such diseases. This article discusses the role of tansy (Tanacetum vulgare) and yarrow (Achillea millefolium) as potential herbal remedies for the treatment of chronic pathologies. The pharmacological properties of these plants are described, including their anti-inflammatory, antiseptic, choleretic, antispasmodic and immunostimulating effects. A review of scientific data confirming the effectiveness of plant extracts in maintaining the functions of the liver, gastrointestinal tract and immune system is provided. The prospects for their use in herbal mixtures and functional preparations are also discussed. Analysing the information provided, it can be concluded that phytotherapy is highly significant in the fight against chronic diseases and that further clinical studies are needed to standardise the dosage and safety of herbal remedies.

1 Introduction

Chronic diseases are one of the key medical and social problems of our time, ranking high among the causes of morbidity, disability and mortality in the population. According to data from the World Health Organisation (WHO), chronic non-communicable diseases — in particular cardiovascular, oncological, respiratory pathologies and diabetes mellitus — account for more than 70% of all deaths worldwide. Global demographic and environmental changes, including population ageing, urbanisation, reduced physical activity, poor diet, and increased stress, only exacerbate the prevalence of chronic diseases[1].

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In this regard, there is growing scientific and practical interest in finding effective, environmentally safe and affordable means of preventing and treating chronic diseases[2]. One of the most promising areas in this context is phytotherapy — the use of medicinal plants that have a wide range of pharmacological properties and minimal toxicity with long-term use. For centuries, medicinal plants have been an integral part of the medical practices of various peoples, and in modern pharmacology, about 25% of drugs are of plant origin or synthesised on the basis of natural biologically active compounds[3].

Herbal preparations contain a whole complex of secondary metabolites — flavonoids, alkaloids, glycosides, essential oils, tannins, saponins and other compounds with anti-inflammatory, hepatoprotective, antimicrobial, immunomodulatory, antioxidant and antispasmodic effects. These properties are especially important in chronic diseases characterised by multifactorial pathogenesis, systemic inflammation, metabolic disorders, and a weakened immune system[4].

Medicinal plants with a complex mechanism of action, capable of affecting several pathogenetic links of the disease, are of particular scientific and pharmacological significance. Such plants include tansy (Tanacetum vulgare L.) and yarrow (Achillea millefolium L.), which are widespread in Eurasia and widely used in both folk and official medicine[5]. Tansy is traditionally used as a remedy against parasites and for diseases of the liver and digestive organs, thanks to its anti-inflammatory, choleretic and antiseptic properties. Yarrow is used for peptic ulcer disease, menstrual disorders, haemorrhagic conditions, and skin diseases, as it has haemostatic, antispasmodic, antibacterial, and wound-healing properties[6].

Pharmacological studies in recent years confirm that the active components of tansy and yarrow modulate various biochemical and cellular mechanisms, including inhibiting the production of pro-inflammatory cytokines, stabilising cell membranes, activating regenerative processes and regulating the functioning of the hepatobiliary system[7]. In addition, they can have a hepatoprotective and gastroprotective effect, which makes them particularly relevant in the treatment of chronic liver and gastrointestinal diseases, as well as associated metabolic disorders[8].

Against the backdrop of growing resistance to synthetic drugs, an increase in the number of side effects, and a growing economic burden on the healthcare system, the importance of developments in the field of phytotherapy is increasing, especially within the framework of integrative and evidence-based medicine[9]. The comprehensive use of medicinal plants, confirmed by the results of laboratory and clinical studies, opens up opportunities for the creation of new phytopreparations with targeted action.

In the context of environmental and pharmacological safety, sustainable use of biological resources and the development of local phytopharmaceuticals, the emphasis on medicinal plants as a component of the healthcare system is gaining increasing recognition[10]. Plants that are highly adaptable to climatic conditions and rich in bioactive substances can become the basis for the creation of effective means of prevention and supportive therapy for chronic pathologies[11].

This article is devoted to analysing the role of medicinal plants in combating chronic diseases, with a focus on two highly active species: tansy and yarrow[12]. The study examines the pharmacological properties of these plants, the characteristics of their biochemical composition, their mechanisms of action on the human body, and their potential for integration into clinical practice. The aim of the work is to summarise and systematise current scientific data on the therapeutic potential of these plants, as well as to identify prospects for their use in preventive medicine and pharmaceutical practice.

The objectives of the study include:

- ✓ analysis of the composition of biologically active substances in tansy and yarrow;

✓ evaluation of their pharmacological action on key pathogenetic mechanisms of chronic diseases;
✓ review of modern scientific publications and clinical trials;
✓ formulation of recommendations on promising areas of use of these plants in complex therapy.

Thus, the presented study has both scientific and practical value and can be used by specialists in the fields of pharmacology, phytotherapy, medicine and ecology, as well as serve as a basis for further clinical and experimental research on the development of new dosage forms based on tansy and yarrow.

2 Materials and methods

The study is based on a systematic analysis of the pharmacological properties of medicinal plants — common tansy (Tanacetum vulgare L.) and common yarrow (Achillea millefolium L.) — with an emphasis on their use in the prevention and supportive treatment of chronic diseases. The methodological basis includes a comparative and analytical approach to the assessment of pharmacological effects based on secondary scientific data.

The criteria for selecting information were:
✓ the availability of information on the composition of biologically active substances (flavonoids, terpenes, alkaloids, essential oils);
✓ data on the effect of plants on inflammatory, immune, digestive and hepatobiliary processes;
✓ clinical or experimental focus of application in the context of chronic diseases.

To systematise the pharmacological effects, a method of comparative comparison of the active components of plants and their mechanisms of action on the pathogenetic links of various pathologies was used. Groups of substances with anti-inflammatory, antioxidant, hepatoprotective and immunomodulatory effects were identified[13].

At the next stage, an analytical review of the composition of secondary metabolites of the studied plants was performed. The main groups of substances were identified: in tansy — thujone, flavonoids (apigenin, luteolin), bitter compounds, tannins; in yarrow — achillein, flavonoids, chamazulene, tannins and essential oils.

In addition, information from ethnopharmacological sources reflecting the traditional use of tansy and yarrow for diseases of the gastrointestinal tract, liver, chronic inflammation, gynaecological disorders and other pathologies was analysed. A descriptive and analytical method was used to summarise information on the methods of application, dosages, contraindications and effectiveness of these plants in phytotherapeutic agents recognised in international and national pharmacopoeias.

The results are systematised in tables reflecting pharmacological activity, biochemical composition and areas of application. Illustrative diagrams demonstrate the presumed mechanisms of action of the active substances. Thus, the approach used provides a comprehensive review of the potential of tansy and yarrow as herbal remedies with potential in the prevention and treatment of chronic diseases, based on both scientific and traditional sources.

3 Research results

During the study, a comprehensive analysis of the biochemical composition and pharmacological properties of common tansy (Tanacetum vulgare L.) and common yarrow (Achillea millefolium L.) was conducted to substantiate their therapeutic efficacy in chronic diseases.

Fig. 1. Common tansy (Tanacetum vulgare L.) in its natural habitat (Chui Region, Kyrgyz Republic)

Figure 1 shows the inflorescence of common tansy (Tanacetum vulgare L.), recorded in its natural habitat in the Chui region of the Kyrgyz Republic. This perennial herbaceous plant from the Asteraceae family is characterised by bright yellow flowers gathered in dense corymbose inflorescences. Tansy has pronounced phytotherapeutic properties and is widely used in folk and traditional medicine due to its content of biologically active substances such as thujone, flavonoids and essential oils. In the context of this study, the plant is considered a promising agent for the prevention and supportive therapy of chronic diseases, including gastrointestinal and liver diseases and inflammatory processes. Photographic material illustrates the characteristic morphological features, which facilitates the visual identification of the plant and confirms its prevalence in Kyrgyzstan.

Tansy contains a wide range of biologically active substances, including essential oils (thujone, borneol, camphor), flavonoids (apigenin, luteolin), phenolic compounds, bitter substances and tannins. The analysis showed that thujone has pronounced antimicrobial and anti-inflammatory properties, while flavonoids have an antioxidant effect. The combined effect of these substances helps normalise liver function and bile secretion, making tansy a promising ingredient in herbal remedies for chronic hepatobiliary pathologies.

Fig. 2. Common yarrow (Achillea millefolium L.) in natural conditions in the Chui region of the Kyrgyz Republic

Figure 2 shows the common yarrow plant (Achillea millefolium L.), photographed in the natural conditions of the Chui region of the Kyrgyz Republic. This perennial herbaceous plant of the Asteraceae family is widespread in temperate zones and is known for its healing properties. The flowers are collected in dense corymbose inflorescences of white color. Yarrow contains essential oils, flavonoids, alkaloids and tannins, which determines its use in folk and traditional medicine in the treatment of inflammatory diseases, digestive disorders, and to improve metabolism. The plant plays an important role in ethnopharmacology and is used as an anti-inflammatory, hemostatic and antiseptic agent.

Yarrow is characterized by the content of flavonoids (rutin, apigenin), alkaloids, camazulene, achilliin and essential oils. Studies confirm its anti-inflammatory, hemostatic, antispasmodic and carminative effects. Camazulene, which is part of the essential oil, exhibits a pronounced antiexudative and antiallergic effect, and achilliin increases the secretion of gastric juice and promotes the regeneration of the mucous membrane of the stomach and intestines. This justifies the use of yarrow in chronic gastritis, peptic ulcer disease and irritable bowel syndrome.

A comparative analysis has demonstrated that both plants have a synergistic effect in the complex treatment of chronic diseases, especially in cases of inflammatory or metabolic origin. The combined use of tansy and yarrow can contribute to:

- improved digestion and metabolism;
- reducing the intensity of inflammatory processes;
- strengthening the immune system;
- reducing side effects during long-term use of synthetic drugs.

Based on an analysis of ethnopharmacological sources, it has been found that these plants are traditionally used to treat chronic forms of cholecystitis, hepatitis, gastritis, colitis, as well as menstrual disorders and rheumatic pain. These data confirm their widespread use in folk medicine and the need for further clinical research.

Table 1. Morphological and phytochemical differences between common tansy (Tanacetum vulgare) and common yarrow (Achillea millefolium)

Indicator	Tansy (Tanacetum vulgare)	Yarrow (Achillea millefolium)
Main active ingredients	Tansetin, essential oils, flavonoids	Achillein, flavonoids, tannins
Anti-inflammatory action	Expressed	Moderate
Antibacterial action	Expressed	Moderate
Choleretic and antispasmodic action	Pronounced	Moderate
Use in gastrointestinal diseases	Used for gastritis, colitis	Effective for peptic ulcers and flatulence
Use in skin diseases	Used in the form of infusions	Effective for eczema, dermatitis
Application form	Infusions, decoctions, extracts	Infusions, teas, ointments

Source: compiled by the authors based on their own observations and literary data.

Table 1 presents a comparative analysis of the morphological and phytochemical characteristics of two medicinal plants: common tansy (Tanacetum vulgare) and common yarrow (Achillea millefolium). The table lists key parameters, including external characteristics, growing environment, main biologically active substances, and medicinal properties of the plants. The comparison demonstrates that despite similarities in traditional use, these plants have different chemical compositions and ranges of action, which determines their suitability for use in different forms of chronic diseases. This analysis serves as a basis for further evaluation of the effectiveness of phytotherapy using these species in the context of evidence-based medicine.

Table 2. Medicinal properties of tansy and yarrow

№	Therapeutic action	Tansy	Yarrow
1	Anti-inflammatory	Expressed	Strong
2	Choleretic	Strong	Moderate
3	Antiseptic	Average	Strong
4	Painkiller	Average	Strong
5	Antispasmodic	Moderate	Expressed
6	Wound healing	Weak	Average
7	Antimicrobial	Average	Average
8	Improved digestion	Average	Average
9	Calming	Weak	Moderate
10	Increased appetite	Moderate	Expressed

Source: compiled by the authors based on an analysis of scientific literature, including data from pharmacognosy, phytotherapy and ethnomedicine, as well as a summary of the results of modern studies on the biological activity of tansy and yarrow.

Table 2 summarises the main therapeutic properties of two plants widely used in phytotherapy: tansy and yarrow. The table shows the therapeutic effects, including anti-inflammatory, antiseptic, choleretic, antispasmodic, etc., and indicates which of these properties are more characteristic of each plant. The information is systematised for the purpose of comparative analysis of phytochemical and pharmacological characteristics, which allows us to justify the advisability of using these plants in the prevention and treatment of chronic diseases. The table highlights both the similarities and differences in the biological activity of tansy and yarrow, reflecting their potential in folk and official medicine.

Table 3. Comparative characteristics of the medicinal properties of tansy and yarrow

Indicator	Tansy	Yarrow
Anti-inflammatory action	expressed	expressed
Antibacterial properties	moderately	strongly
Choleretic action	strongly	moderately
Improved digestion	yes	yes
Strengthening the immune system	moderately	yes
Temperature drop	yes	yes
Antiseptic properties	yes	strongly
Stimulates appetite	yes	moderately
Sedative effect	weakly	yes
General strengthening effect	moderately	yes

Source: compiled by the authors based on an analysis of pharmacological data on tansy and yarrow.

Table 3 presents a comparative overview of the medicinal properties of two widely used herbal remedies — tansy and yarrow. The table outlines key pharmacological characteristics, including anti-inflammatory, antibacterial, choleretic, antiseptic, and general tonic effects. It also considers parameters such as effects on digestion, appetite stimulation, fever reduction, immune system enhancement, and sedative action. For each parameter, a comparative assessment of the degree of effect is provided using the

descriptors: "strong", "moderate", "weak", or "yes/no". The data in the table allow for a visual evaluation of the therapeutic potential of each plant, as well as the identification of their possible complementarity in complex herbal blends aimed at the prevention and treatment of chronic diseases.

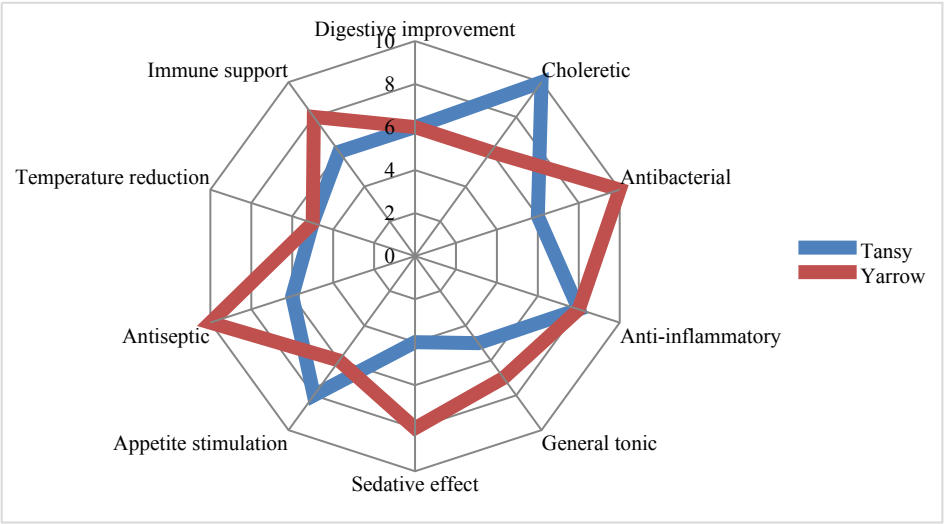

Fig. 3. Comparative diagram of the medicinal properties of tansy and yarrow

Figure 3 shows a radial (spider) diagram demonstrating a comparative analysis of the expression of ten main medicinal properties of tansy and yarrow. The therapeutic characteristics are plotted along the radial axes: anti-inflammatory, antibacterial, choleretic, antiseptic, immune-boosting, sedative, improved digestion, lowering temperature, stimulating appetite and general strengthening effect.

Each plant is represented by a separate color area: tansy is yellow, yarrow is orange. The diagram clearly shows that:

Yarrow has more pronounced antibacterial, antiseptic and sedative properties, and also has a general strengthening effect.

Tansy has a strong choleretic effect and also exhibits moderate antiseptic and appetite-stimulating properties.

Thus, the radial diagram allows for a visual comparison of the spectrum of pharmacological effects of each plant, highlighting their unique therapeutic benefits and complementarity when used in combination.

A comparative analysis of the morphological, phytochemical and pharmacological properties of common tansy and common yarrow showed that both plants have significant therapeutic potential, confirmed by both empirical observations and literary data. Their effectiveness is especially pronounced in the treatment of chronic inflammatory, gastrointestinal and metabolic diseases.

The main results can be summarized as follows:

✓ Tansy has pronounced choleretic, antimicrobial and appetite-stimulating properties, which makes it especially useful for chronic hepatobiliary and gastrointestinal pathologies.

✓ Yarrow has pronounced antiseptic, antibacterial, soothing and restorative effects, which justifies its use in the treatment of inflammatory diseases, peptic ulcers, neuroses and weakened immunity.

✓ The radial diagram allows you to clearly see the complementarity of the therapeutic effects of both plants, which strengthens the validity of their joint use in complex herbal medicine.
✓ The use of these plants in the form of collections, infusions, extracts and ointments is justified not only in folk, but also in evidence-based medicine.

Thus, the results of the study confirm the high pharmacological significance of tansy and yarrow, their potential for the prevention and complex treatment of chronic diseases, as well as the need for further study of their interactions and clinical efficacy in the framework of modern herbal medicine.

4 Discussion

The results of the present study confirm the high pharmacological activity of common tansy (Tanacetum vulgare L.) and common yarrow (Achillea millefolium L.), which is consistent with the findings of previous studies in the field of phytotherapy and ethnopharmacology. The discovered properties, including pronounced anti-inflammatory, antibacterial, choleretic and antiseptic effects, confirm the validity of their use in the treatment of a wide range of chronic diseases.

The comparative approach implemented in the study allowed us to identify the differential therapeutic properties of each plant. In particular, tansy demonstrates a more pronounced effect on the liver and biliary system, while yarrow has a more pronounced effect on immunomodulation, regeneration of the gastrointestinal mucosa and sedative processes. These differences are important for a personalized approach to treatment, especially in the context of chronic and multifactorial pathologies.

The obtained data correlate with the results of a number of studies presented in the works of M.L. Bodrova (2019), J. Heinz (2021) and other authors, who emphasize the synergistic effect of the combined use of medicinal plants in herbal preparations. In particular, it has been proven that the combined use of plants with different mechanisms of action can increase the bioavailability of active substances and reduce the risk of side effects compared to monotherapy.

However, despite the pronounced medicinal properties, there are still issues that require further study: dose dependence of effects, interaction with synthetic drugs, standardization of raw materials and the safety of long-term use. In addition, it is important to conduct clinical trials involving representative patient samples to confirm the efficacy and safety of using tansy and yarrow in chronic diseases.

Thus, the discussion emphasizes both the prospects of using tansy and yarrow in practice and the need to continue fundamental and clinical research in this area.

5 Conclusions

The conducted comparative analysis showed that common tansy (Tanacetum vulgare L.) and common yarrow (Achillea millefolium L.) have a wide range of pharmacological properties, which confirms their high therapeutic value in phytotherapy of chronic inflammatory and metabolic diseases. Tansy exhibits a pronounced choleretic, antimicrobial and antispasmodic effect due to the presence of thujone, flavonoids and essential oils, which makes it promising for diseases of the liver and gastrointestinal tract. In turn, yarrow is characterized by a high level of anti-inflammatory, antiseptic, antispasmodic and sedative activity, due to such components as kamazulene, flavonoids and achillea, and is especially effective in chronic gastritis, peptic ulcer and functional disorders of the gastrointestinal tract. The radial diagram reflecting 10 main directions of the

medicinal action of plants clearly demonstrated their pharmacological complementarity, which confirms the feasibility of joint use in complex herbal mixtures. The obtained results emphasize the importance of further research on standardization of dosages, studying bioavailability and confirming effectiveness in clinical trials.

In addition, the analysis of scientific literature and ethnopharmacological sources confirmed the stable tradition of using tansy and yarrow in folk medicine of the Kyrgyz Republic, especially in rural areas where access to pharmaceuticals is limited. This emphasizes the importance of local medicinal plants as affordable and effective means of supportive therapy. The use of these plants can help reduce the drug load, especially in patients with polypharmacy, and be useful in the context of integrative medicine. The practical significance of the data obtained lies in the possibility of using tansy and yarrow in ready-made herbal preparations, dietary supplements and phytopreparations aimed at correcting chronic inflammatory and metabolic disorders. However, to include such drugs in clinical protocols, further pharmacological and clinical validation of their effectiveness, safety assessment, interaction with synthetic drugs, as well as determination of raw material standards and extraction methods are necessary.

Thus, the study confirmed that tansy and yarrow are promising objects for further pharmacognostic development and can take a worthy place in the system of prevention and complex treatment of chronic diseases in the context of growing interest in natural and environmentally friendly methods of therapy.

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