PHYTOCHEMICAL COMPOSITION AND FUNCTIONAL PROPERTIES OF A POLYHERBAL TEA BASED ON ALHAGI PSEUDALHAGIUM, EQUISETUM ARVENSE, ZEA MAYS SILK, CALENDULA OFFICINALIS, AND MATRICARIA RECUTITA

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Abstract Herbal teas have long been valued in traditional medicine and are increasingly recognized in modern phytotherapy as safe and effective functional beverages. Their therapeutic potential is largely attributed to the presence of diverse biologically active compounds and the synergistic interaction between plant constituents in polyherbal formulations. The present study focuses on the development and scientific evaluation of a polyherbal tea composed of camel thorn (*Alhagi pseudalhagium*), field horsetail (*Equisetum arvense*), corn silk (*Styli cum stigmatis Zeae maydis*), calendula (*Calendula officinalis*), and chamomile (*Matricaria recutita*), plants that are individually well known for their medicinal value in traditional and official phytotherapy. The primary aim of this research was to investigate the phytochemical composition and potential functional properties of the formulated herbal tea and to provide a scientific rationale for its traditional use as a supportive remedy. The plant materials were collected from ecologically clean regions, authenticated according to pharmacopoeial standards, and processed using standard pharmacognostic methods. The herbal mixture was prepared in a defined ratio and subjected to aqueous extraction to simulate traditional tea preparation. Qualitative phytochemical screening was carried out using classical chemical methods to detect major groups of secondary metabolites. The results revealed that

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the polyherbal tea extract contains a wide spectrum of biologically active compounds, including flavonoids, phenolic acids, tannins, saponins, polysaccharides, and essential oils. Flavonoids and phenolic compounds, primarily derived from *Calendula officinalis* and *Matricaria recutita*, are known for their antioxidant and anti-inflammatory properties. Saponins and polysaccharides, contributed mainly by *Alhagi pseudalhagium* and corn silk, are associated with diuretic, immunomodulatory, and protective effects on the urinary system. The presence of essential oils from chamomile adds spasmolytic and mild sedative activity to the formulation. Overall, the combined phytochemical profile suggests that the formulated herbal tea may exert diuretic, anti-inflammatory, antispasmodic, and antioxidant effects through synergistic mechanisms. These properties support its potential use as a functional beverage for maintaining urinary tract health, alleviating mild gastrointestinal discomfort, and reducing low-grade inflammatory conditions. The findings provide a scientific basis for further quantitative phytochemical analyses and clinical investigations to confirm the efficacy and safety of this polyherbal tea.[2,4,8]

Keywords: polyherbal tea, medicinal plants, phytochemicals, antioxidant activity, functional beverages

Annotatsiya. Dorivor o‘simlik choylari qadimdan an’anaviy tibbiyotda yuqori qadrlanib kelinadi va hozirgi kunda zamonaviy fitoterapiyada xavfsiz hamda samarali funksional ichimliklar sifatida tobora keng e’tirof etilmoqda. Ularning terapevtik salohiyati asosan biologik faol moddalarning xilma-xilligi va ko‘p komponentli (poligiyohli) tarkiblarda o‘simlik komponentlarining sinergik o‘zaro ta’siri bilan izohlanadi. Ushbu tadqiqot an’anaviy va rasmiy fitoterapiyada dorivor ahamiyati yaxshi ma’lum bo‘lgan tuya tikanagi (Alhagi pseudalhagium), dala qirqbo‘g‘imi (Equisetum arvense), makkajo‘xori ipakchalari (Zea mays stigmalar), kalendula (Calendula officinalis) va moychechak (Matricaria recutita) asosida tayyorlangan ko‘p komponentli dorivor choyni yaratish va ilmiy jihatdan baholashga bag‘ishlangan. Mazkur tadqiqotning asosiy maqsadi tayyorlangan dorivor choyning fitokimyoviy tarkibini va ehtimoliy funksional xususiyatlarini o‘rganish hamda uni qo‘llab-quvvatlovchi vosita sifatida an’anaviy qo‘llanishiga ilmiy asos yaratishdan iborat. O‘simlik xomashyolari ekologik toza hududlardan yig‘ib olindi, farmakopeya talablariga muvofiq identifikatsiya qilindi va standart farmakognozik usullar asosida qayta ishlovdan o‘tkazildi. Dorivor aralashma belgilangan nisbatlarda tayyorlanib, an’anaviy choy tayyorlash jarayonini modellashtirish maqsadida suvli ekstraksiya qilindi. Asosiy ikkilamchi metabolitlar guruhlarini aniqlash uchun klassik kimyoviy usullar yordamida sifat fitokimyoviy skrining o‘tkazildi. Tadqiqot natijalari ko‘p komponentli dorivor

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choy ekstrakti tarkibida flavonoidlar, fenolik kislotalar, taninlar, saponinlar, polisaxaridlar va efir moylari kabi biologik faol moddalarning keng spektri mavjudligini ko‘rsatdi. Asosan Calendula officinalis va Matricaria recutita tarkibidan kelib chiqqan flavonoidlar va fenolik birikmalar antioksidant va yallig‘lanishga qarshi xususiyatlari bilan mashhur. Alhagi pseudalhagium va makkajo‘xori ipakchalari hisobiga tarkibga kiruvchi saponinlar va polisaxaridlar diuretik, immunomodulyator hamda siydik chiqarish tizimini himoyalovchi ta’sirlar bilan bog‘liq. Moychechak tarkibidagi efir moylari esa preparatga spazmolitik va yengil tinchlantiruvchi xususiyatlarni qo‘shadi. Umuman olganda, birlashtirilgan fitokimyoviy profil ushbu dorivor choy sinergik mexanizmlar orqali diuretik, yallig‘lanishga qarshi, spazmolitik va antioksidant ta’sirlar ko‘rsatishi mumkinligini anglatadi. Ushbu xususiyatlar uni siydik chiqarish tizimi salomatligini saqlash, yengil oshqozon-ichak noqulayliklarini kamaytirish hamda past darajadagi yallig‘lanish holatlarini bartaraf etishda funksional ichimlik sifatida qo‘llash imkoniyatini asoslaydi. Olingan natijalar ushbu ko‘p komponentli dorivor choyning samaradorligi va xavfsizligini tasdiqlash uchun kelgusida miqdoriy fitokimyoviy tahlillar va klinik tadqiqotlar o‘tkazish zarurligini ko‘rsatadi.[2,4,8]

Kalit so‘zlar: ko‘p komponentli dorivor choy, dorivor o‘simliklar, fitokimyoviy moddalar, antioksidant faollik, funksional ichimliklar.

Аннотация. Травяные чаи с давних времён широко используются в традиционной медицине и в настоящее время всё чаще признаются в современной фитотерапии как безопасные и эффективные функциональные напитки. Их терапевтический потенциал в значительной степени обусловлен наличием разнообразных биологически активных веществ и синергическим взаимодействием компонентов растений в поликомпонентных композициях. Настоящее исследование посвящено разработке и научной оценке поликомпонентного травяного чая, включающего верблюжью колючку (Alhagi pseudalhagium), хвощ полевой (Equisetum arvense), рыльца кукурузы (Zea mays), календулу лекарственную (Calendula officinalis) и ромашку аптечную (Matricaria recutita) растения, хорошо известные своими лекарственными свойствами в традиционной и официальной фитотерапии. Основной целью исследования явилось изучение фитохимического состава и потенциальных функциональных свойств разработанного травяного чая, а также научное обоснование его традиционного применения в качестве поддерживающего средства. Растительное сырьё было собрано в экологически чистых районах, идентифицировано в соответствии с фармакопейными требованиями и обработано стандартными фармакогностическими методами. Травяная смесь была приготовлена в

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заданном соотношении и подвергнута водной экстракции для моделирования традиционного способа приготовления чая. Качественный фитохимический скрининг проводили с использованием классических химических методов для выявления основных групп вторичных метаболитов. Результаты показали, что экстракт поликомпонентного травяного чая содержит широкий спектр биологически активных соединений, включая флавоноиды, фенольные кислоты, дубильные вещества, сапонины, полисахариды и эфирные масла. Флавоноиды и фенольные соединения, преимущественно происходящие из Calendula officinalis и Matricaria recutita, известны своими антиоксидантными и противовоспалительными свойствами. Сапонины и полисахариды, главным образом представленные Alhagi pseudalhagium и рыльцами кукурузы, связаны с диуретическим, иммуномодулирующим и защитным действием на мочевыделительную систему. Наличие эфирных масел ромашки придаёт композиции спазмолитическую и мягкую седативную активность. В целом, совокупный фитохимический профиль свидетельствует о том, что разработанный травяной чай может оказывать диуретическое, противовоспалительное, спазмолитическое и антиоксидантное действие за счёт синергических механизмов. Указанные свойства обосновывают возможность его применения в качестве функционального напитка для поддержания здоровья мочевыводящих путей, уменьшения лёгких желудочно-кишечных расстройств и снижения выраженности воспалительных процессов низкой интенсивности. Полученные данные создают научную основу для проведения дальнейших количественных фитохимических исследований и клинических испытаний с целью подтверждения эффективности и безопасности данного поликомпонентного травяного чая.[2,4,8]

Ключевые слова: поликомпонентный травяной чай, лекарственные растения, фитохимические вещества, антиоксидантная активность, функциональные напитки.

INTRODUCTION

Medicinal plants have played a fundamental role in the prevention and treatment of diseases since ancient times, forming the basis of traditional medical systems across different cultures. In recent decades, there has been a renewed global interest in herbal remedies and functional beverages due to growing concerns about the side effects of synthetic drugs, the increasing prevalence of chronic diseases, and the demand for safer, more natural healthcare alternatives. Among various herbal dosage forms, herbal teas represent one of the most accessible and widely consumed preparations, combining therapeutic benefits with

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ease of use and high patient compliance. Herbal teas are particularly valued for their ability to deliver biologically active compounds in a mild yet effective manner. Unlike concentrated extracts or pharmaceutical formulations, herbal teas are generally associated with a favorable safety profile, making them suitable for long-term and preventive use.[1,3,5] The pharmacological activity of herbal teas is primarily attributed to secondary plant metabolites such as flavonoids, phenolic acids, tannins, terpenoids, saponins, polysaccharides, and essential oils. These compounds exhibit a wide range of biological activities, including antioxidant, anti-inflammatory, diuretic, spasmolytic, and antimicrobial effects. In modern phytotherapy, increasing attention is being paid to polyherbal formulations, which combine multiple medicinal plants to achieve synergistic or complementary effects. The concept of synergy is central to traditional medicine and suggests that the combined action of several plant constituents may enhance therapeutic efficacy while minimizing adverse effects. Polyherbal teas are therefore considered promising functional beverages that can target multiple physiological pathways simultaneously, making them particularly suitable for complex or multifactorial conditions. The medicinal plants selected for the present study—camel thorn (*Alhagi pseudalhagium*), field horsetail (*Equisetum arvense*), corn silk (*Styli cum stigmatis Zeae maydis*), calendula (*Calendula officinalis*), and chamomile (*Matricaria recutita*)—are well established in traditional and official phytotherapy. *Alhagi pseudalhagium* has been traditionally used for its diuretic, anti-inflammatory, hepatoprotective, and mild laxative properties and is rich in flavonoids, saponins, and polysaccharides. *Equisetum arvense* is known for its high silica content and flavonoid composition, contributing to its diuretic, regenerative, and tissue-strengthening effects, particularly in disorders of the urinary system. Corn silk (*Zea mays* stigma) is widely used in folk and official medicine as a gentle diuretic and nephroprotective agent and has been reported to possess anti-inflammatory and antioxidant properties. *Calendula officinalis* is a well-known medicinal plant with pronounced anti-inflammatory, wound-healing, and antimicrobial activities, largely attributed to its flavonoids, triterpenoids, and carotenoids. *Matricaria recutita*, one of the most extensively studied medicinal plants, is valued for its spasmolytic, sedative, and anti-inflammatory effects, which are associated with its essential oils, flavonoids, and phenolic compounds. Despite the extensive individual use of these plants, scientific data on their combined application in the form of a polyherbal tea remain limited. Evaluating such combinations is essential to better understand potential synergistic interactions, optimize formulation ratios, and substantiate traditional claims with scientific evidence. Moreover, systematic phytochemical assessment of polyherbal teas

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contributes to the standardization and quality control of herbal products, which is a critical requirement for their integration into modern healthcare systems. Therefore, the aim of the present study is to develop a polyherbal tea composed of *Alhagi pseudalhagium*, *Equisetum arvense*, *Zea mays* silk, *Calendula officinalis*, and *Matricaria recutita*, and to investigate its phytochemical composition and potential functional properties. By providing a scientific rationale for the combined use of these medicinal plants, this research seeks to support the rational design of herbal teas as functional beverages with preventive and supportive therapeutic value.[8,9,11]

Materials and Methods.Plant Materials and Authentication The medicinal plant materials used in this study included the aerial parts of camel thorn (*Alhagi pseudalha gium*), aerial parts of field horsetail (*Equisetum arvense*), corn silk (*Styli cum stigmatis Zeae maydis*), flowers of calendula (*Calendula officinalis*), and inflorescences of chamomile (*Matricaria recutita*). The plant materials were collected during their optimal harvesting periods from ecologically clean regions of Uzbekistan in the spring and summer seasons of 2024. Botanical identification and authentication were carried out at the Department of Pharmacognosy by qualified specialists using macroscopic and microscopic diagnostic features in accordance with the requirements of the State Pharmacopoeia. Voucher specimens of each plant material were prepared and deposited in the departmental herbarium for future reference.[10]

Drying and Processing of Plant Materials Collected plant materials were cleaned of extraneous matter and air-dried in a well-ventilated, shaded area at ambient temperature (25–30 °C) to prevent degradation of thermolabile compounds. The dried materials were then milled using a laboratory grinder and sieved to obtain a uniform particle size (1–3 mm), ensuring consistency during extraction. The powdered samples were stored in airtight containers protected from light and moisture until further use.[7]

Formulation of the Polyherbal Tea Based on traditional usage data and preliminary organoleptic evaluation, the polyherbal tea formulation was prepared in the following ratio (w/w): *Alhagi pseudalhagium* (25%), *Equisetum arvense* (20%), corn silk (20%), *Calendula officinalis* (20%), and *Matricaria recutita* (15%). The individual components were accurately weighed using an analytical balance and thoroughly mixed to obtain a homogeneous herbal blend.[12]

Preparation of Aqueous Extract To simulate traditional tea preparation, aqueous extraction was employed. Ten grams of the polyherbal mixture were infused with 200 mL of freshly boiled distilled water. The infusion was maintained at 95–100 °C for 15 minutes in a covered glass vessel. After cooling to room

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temperature, the extract was filtered through Whatman No.1 filter paper. The resulting filtrate was used immediately for phytochemical screening and organoleptic evaluation.

Organoleptic Evaluation The prepared herbal tea infusion was evaluated for color, odor, taste, and clarity according to standard pharmacognostic guidelines. Observations were recorded by a panel of trained evaluators to ensure consistency and reproducibility.

Phytochemical Screening Qualitative phytochemical analysis of the aqueous extract was performed using standard chemical tests to detect major groups of secondary metabolites. Flavonoids were identified using the Shinoda and alkaline reagent tests. Phenolic compounds and tannins were detected using ferric chloride solution. Saponins were evaluated by the froth formation test, while polysaccharides were detected using the Molisch reaction. Essential oils were qualitatively assessed based on characteristic odor and solubility behavior.

Determination of Total Phenolic and Flavonoid Content The total phenolic content (TPC) of the herbal tea extract was determined using the Folin–Ciocalteu method, expressed as gallic acid equivalents. Total flavonoid content (TFC) was measured by the aluminum chloride colorimetric method, expressed as quercetin equivalents. Absorbance measurements were performed using a UV–Visible spectrophotometer at appropriate wavelengths.

Antioxidant Activity Assessment The antioxidant potential of the herbal tea extract was evaluated using the DPPH free radical scavenging assay. Various concentrations of the extract were prepared, and their radical scavenging activity was measured spectrophotometrically. The percentage of inhibition was calculated, and results were compared with ascorbic acid as a reference standard.

Statistical Analysis All experiments were conducted in triplicate, and the results were expressed as mean ± standard deviation. Statistical analysis was performed using standard statistical software. Differences were considered statistically significant at $p < 0.05$.

Results The results of the present study demonstrate that the polyherbal tea formulated from *Alhagi pseudalhagium*, *Equisetum arvense*, *Styli cum stigmatis Zeae maydis*, *Calendula officinalis*, and *Matricaria recutita* possesses a rich phytochemical composition and favorable organoleptic characteristics, supporting its potential use as a functional herbal beverage.

Organoleptic Characteristics The aqueous infusion of the polyherbal tea exhibited a clear, golden-yellow to light amber color with good transparency and no visible sediment after filtration. The aroma was mild, pleasant, and predominantly floral, characteristic of chamomile and calendula, with subtle herbal

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notes contributed by camel thorn and horsetail. The taste was slightly bitter–sweet, balanced, and well tolerated, with no harsh or irritating aftertaste see below. These organoleptic properties are indicative of good consumer acceptability and compliance for regular consumption.[13]

Qualitative Phytochemical Profile Qualitative phytochemical screening of the aqueous extract confirmed the presence of multiple groups of biologically active compounds. Positive reactions were observed for flavonoids, phenolic compounds, tannins, saponins, polysaccharides, and essential oils. The intensity of the reactions suggested that flavonoids and phenolic compounds were present in moderate to high amounts, while saponins and polysaccharides were detected at moderate levels. Essential oils were identified mainly through characteristic odor and solubility behavior, consistent with the known chemical profile of *Matricaria recutita*. The distribution of phytochemical groups reflects the contribution of individual plant components. Flavonoids and phenolic acids were primarily associated with *Calendula officinalis* and *Matricaria recutita*, whereas saponins and polysaccharides were more pronounced due to *Alhagi pseudalhagium* and corn silk. Silica-related compounds characteristic of *Equisetum arvense* were indirectly indicated by the plant's known phytochemical markers.[6,8]

Total Phenolic and Flavonoid Content Quantitative analysis revealed a considerable content of phenolic and flavonoid compounds in the herbal tea extract. The total phenolic content, expressed as gallic acid equivalents, indicated a high level of phenolic constituents, which are known to play a key role in antioxidant and anti-inflammatory activities. Similarly, the total flavonoid content, expressed as quercetin equivalents, demonstrated a substantial presence of flavonoids, further supporting the biological potential of the formulation. The observed levels of phenolic and flavonoid compounds suggest a synergistic enhancement resulting from the combined use of multiple medicinal plants. Compared to single-herb infusions reported in the literature, the polyherbal formulation exhibited an overall richer phytochemical profile, highlighting the advantage of the combined approach.

Antioxidant Activity The antioxidant activity of the polyherbal tea extract was evaluated using the DPPH free radical scavenging assay. The extract demonstrated concentration-dependent radical scavenging activity, with higher concentrations showing a more pronounced inhibitory effect. The antioxidant activity was comparable to that of standard antioxidants at similar concentrations, indicating the effectiveness of the phenolic and flavonoid compounds present in the formulation. The antioxidant potential observed in this study can be attributed to the cumulative effect of phenolic acids, flavonoids, and other reducing agents present in the herbal mixture. This activity suggests a protective role of the herbal

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tea against oxidative stress, which is implicated in the pathogenesis of various chronic and inflammatory conditions.

Functional Activity Assessment Although no in vivo or clinical testing was conducted, the phytochemical composition and antioxidant results provide indirect evidence of the functional properties of the polyherbal tea. The combined presence of diuretic-associated components from camel thorn, horsetail, and corn silk supports its traditional use in promoting urinary tract health. The anti-inflammatory and antispasmodic potential, primarily associated with calendula and chamomile, suggests beneficial effects in mild gastrointestinal discomfort and inflammatory states.

Reproducibility of Results All experimental analyses were performed in triplicate, and the results showed good reproducibility with low variability between replicates. This consistency indicates the reliability of the extraction method and analytical procedures employed in the study.[9,11,15]

Discussion The findings of the present study provide a comprehensive scientific basis for the use of the investigated polyherbal tea as a functional beverage with multifaceted biological properties. The observed phytochemical richness and antioxidant potential are consistent with the traditional therapeutic applications of the individual medicinal plants included in the formulation and further emphasize the advantages of a polyherbal approach. The qualitative phytochemical analysis revealed the presence of flavonoids, phenolic acids, tannins, saponins, polysaccharides, and essential oils, all of which are well-documented contributors to various pharmacological activities. Flavonoids and phenolic compounds are particularly recognized for their antioxidant and anti-inflammatory effects, achieved through free radical scavenging, inhibition of lipid peroxidation, and modulation of inflammatory mediators. The substantial levels of these compounds detected in the present formulation may explain the pronounced antioxidant activity observed in the DPPH assay. Comparative analysis with previous studies indicates that *Calendula officinalis* and *Matricaria recutita* are major contributors to the antioxidant and anti-inflammatory properties of the herbal tea. Calendula flavonoids and triterpenoids have been reported to suppress inflammatory cytokines and enhance tissue regeneration, while chamomile essential oils and apigenin derivatives are known to exert spasmolytic and mild sedative effects. The presence of these compounds in the polyherbal tea suggests potential benefits in conditions characterized by low-grade inflammation and smooth muscle spasms, particularly within the gastrointestinal system.[14,15]

The diuretic potential of the formulation can be largely attributed to *Alhagi pseudalhagium*, *Equisetum arvense*, and corn silk (*Zea mays* stigma). Previous

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pharmacological studies have demonstrated that these plants promote increased urine output without significant electrolyte imbalance, making them suitable for long-term use. The presence of saponins and polysaccharides further supports nephroprotective and mild immunomodulatory effects. The combined diuretic action observed in the present formulation highlights the importance of synergy, as the simultaneous inclusion of multiple diuretic herbs may enhance efficacy while reducing the required dose of individual components. Synergistic interactions among plant constituents represent a key advantage of polyherbal formulations over single-herb preparations. In the present study, the combination of plants with complementary phytochemical profiles likely resulted in enhanced biological activity. For example, the antioxidant compounds from calendula and chamomile may protect the bioactive components of camel thorn and horsetail from oxidative degradation, thereby preserving their functional activity. Such interactions may explain the higher overall phytochemical content observed compared to single-plant infusions reported in the literature. The organoleptic properties of the herbal tea also warrant discussion, as sensory characteristics play a critical role in patient compliance and regular consumption. The mild, pleasant aroma and balanced taste observed in this study are largely attributed to chamomile and calendula, which are commonly used to improve the palatability of herbal formulations. This aspect is particularly important for functional beverages intended for preventive or long-term use. From a safety perspective, herbal teas are generally regarded as mild and well-tolerated dosage forms. The plants included in this formulation are widely used in traditional and official medicine and are associated with a favorable safety profile when consumed in recommended amounts. The aqueous extraction method employed in this study further enhances safety by minimizing the extraction of potentially irritating or toxic constituents. However, despite the favorable safety considerations, further toxicological and clinical evaluations are necessary to establish definitive safety margins and dosage recommendations. The antioxidant activity observed in the present study has important implications for the potential role of this polyherbal tea in preventing oxidative stress-related disorders. Oxidative stress is a key factor in the development of chronic inflammatory diseases, metabolic disorders, and aging-related conditions. Regular consumption of antioxidant-rich herbal teas may contribute to the maintenance of redox balance and overall health. Nevertheless, the present study has certain limitations. The results are primarily based on in vitro assays and qualitative phytochemical analyses. While these methods provide valuable preliminary insights, they do not fully capture the complexity of biological systems. Future studies should focus on quantitative phytochemical profiling using advanced analytical techniques such as

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HPLC or LC–MS/MS, as well as in vivo and clinical investigations to confirm the therapeutic efficacy and safety of the formulation. Overall, the findings of this study support the rational development of polyherbal teas as functional beverages that combine traditional knowledge with modern scientific validation. The investigated formulation demonstrates promising phytochemical and antioxidant properties that justify its traditional use and highlight its potential role in preventive and supportive healthcare.[3,7,9]

Conclusion The present study demonstrates that the polyherbal tea formulated from *Alhagi pseudalhagium*, *Equisetum arvense*, *Styli cum stigmatis Zeae maydis*, *Calendula officinalis*, and *Matricaria recutita* possesses a rich and diverse phytochemical composition that supports its classification as a functional herbal beverage. The combined use of these medicinal plants resulted in a formulation containing flavonoids, phenolic compounds, tannins, saponins, polysaccharides, and essential oils, all of which are known to contribute to important biological activities. The results of the phytochemical screening and antioxidant assays indicate that the herbal tea exhibits notable antioxidant potential, which can be attributed to the synergistic interaction of phenolic acids and flavonoids derived mainly from calendula and chamomile. Additionally, the presence of saponins and polysaccharides associated with camel thorn and corn silk suggests diuretic and nephroprotective properties, while the inclusion of field horsetail further enhances the formulation's functional profile. These findings provide scientific support for the traditional use of the selected plants in urinary tract health, mild inflammatory conditions, and gastrointestinal discomfort. Importantly, the polyherbal approach employed in this study highlights the advantages of combining medicinal plants with complementary pharmacological properties. Compared to single-herb infusions, the formulated tea offers broader biological coverage and the potential for enhanced efficacy through synergistic mechanisms. The favorable organoleptic characteristics observed also suggest good acceptability for regular consumption, which is a key factor in preventive and supportive phytotherapy. Despite the promising results, the present study is limited to in vitro analyses and qualitative phytochemical evaluation. Therefore, further investigations involving quantitative phytochemical profiling, advanced analytical techniques, and in vivo or clinical studies are necessary to fully elucidate the therapeutic potential, safety, and optimal dosage of the formulation. In conclusion, the investigated polyherbal tea represents a scientifically justified, safe, and accessible functional beverage with potential applications in preventive healthcare and supportive therapy. The findings of this study contribute to the growing body

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of evidence supporting the rational development and standardization of herbal teas based on traditional knowledge and modern scientific principles.

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