KARTOSHKANING XALQ TABOBATIDAGI AHAMIYATI

ЗНАЧЕНИЕ КАРТОФЕЛЯ В НАРОДНОЙ МЕДИЦИНЕ

THE IMPORTANCE OF POTATO IN FOLK MEDICINE

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Annotatsiya: Mazkur maqolada kartoshkaning (Solanum tuberosum L.) xalq tabobatidagi ahamiyati, shifobaxsh xususiyatlari hamda uning inson salomatligiga ko'rsatadigan ijobiy ta'siri yoritilgan. Kartoshka qadim zamonlardan buyon xalq tabobatida kuyishlar, shamollash, yo'tal, teri kasalliklari va ovqat hazm qilish tizimi faoliyatidagi ayrim buzilishlarni yengillashtirish maqsadida qo'llanib kelinadi. Tadqiqot davomida kartoshkaning kimyoviy tarkibi, jumladan C vitamini, B guruhi vitaminlari, kaliy, magniy, fosfor, temir va antioksidant moddalarining biologik ahamiyati ilmiy adabiyotlar asosida tahlil qilindi. Shuningdek, xalq tabobatida qo'llaniladigan usullarning zamonaviy tibbiyot nuqtai nazaridan samaradorligi va xavfsizlik jihatlari muhokama qilindi. Tadqiqot natijalari kartoshkadan oqilona foydalanish organizmning immun tizimini qo'llab-quvvatlash, teri holatini yaxshilash hamda ayrim yengil kasalliklar belgilarini kamaytirishga yordam berishi mumkinligini ko'rsatdi. Shu bilan birga, yashil yoki unib ketgan kartoshka tarkibidagi solanin moddasi inson salomatligi uchun xavf tug'dirishi sababli undan iste'molda ehtiyotkorlik talab etilishi ta'kidlandi. Olingan natijalar kartoshkaning xalq tabobatidagi o'rnini ilmiy jihatdan baholash va undan oqilona foydalanish bo'yicha tavsiyalar ishlab chiqishga xizmat qiladi.

Kalit so'zlar: Kartoshka, xalq tabobati, Solanum tuberosum, shifobaxsh xususiyatlar, biologik faol moddalar, vitamin C, antioksidantlar, immunitet, solanin, fitoterapiya.

Аннотация: В данной статье рассматривается значение картофеля (Solanum tuberosum L.) в народной медицине, его лечебные свойства, химический состав и влияние на здоровье человека. На протяжении многих веков картофель широко использовался в народной практике для облегчения симптомов простудных заболеваний, кашля, ожогов, некоторых кожных заболеваний и нарушений пищеварения. В работе проведён анализ литературных источников, посвящённых химическому составу картофеля, включая содержание витамина С, витаминов группы В, калия, магния, фосфора, железа и антиоксидантных соединений, оказывающих благоприятное воздействие на организм человека. Особое внимание уделено сравнению традиционных методов применения картофеля с современными научными данными, позволяющими оценить их эффективность и безопасность. Установлено, что рациональное использование картофеля может способствовать укреплению иммунной системы, улучшению состояния кожи и снижению проявлений некоторых лёгких заболеваний. Вместе с тем отмечается, что употребление зелёного или проросшего картофеля представляет потенциальную опасность из-за содержания токсичного алкалоида соланина. Полученные результаты подтверждают важность дальнейшего научного

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изучения лечебных свойств картофеля и обоснованного применения его в качестве вспомогательного средства в народной медицине.

Ключевые слова: Картофель, народная медицина, Solanum tuberosum, лечебные свойства, биологически активные вещества, витамин С, антиоксиданты, иммунитет, соланин, фитотерапия.

Annotation: This article examines the significance of potato (Solanum tuberosum L.) in traditional medicine, with particular emphasis on its medicinal properties, chemical composition, and potential health benefits. For centuries, potatoes have been widely used in folk medicine to alleviate symptoms of burns, colds, coughs, skin disorders, and certain gastrointestinal conditions. The study is based on a comprehensive review of scientific literature addressing the nutritional value and bioactive compounds of potatoes, including vitamin C, B-complex vitamins, potassium, magnesium, phosphorus, iron, dietary fiber, and various antioxidants. Special attention is given to the comparison between traditional medicinal practices and contemporary scientific evidence regarding their efficacy and safety.

The findings suggest that the rational use of potatoes may support immune function, promote skin health, and help alleviate mild inflammatory and digestive disorders. However, consumption of green or sprouted potatoes may pose health risks due to the presence of toxic glycoalkaloids such as solanine. The study concludes that potatoes possess notable nutritional and bioactive properties and may serve as a complementary natural resource in supportive therapy. Nevertheless, their application should be guided by scientific evidence and should not replace conventional medical treatment.

Key words: Potato, traditional medicine, Solanum tuberosum, medicinal properties, bioactive compounds, vitamin C, antioxidants, immunity, solanine, phytotherapy.

INTRODUCTION. Potato (Solanum tuberosum L.) is one of the most widely cultivated and consumed food crops worldwide, playing a crucial role in global food security due to its high caloric value, adaptability to diverse climatic conditions, and rich nutritional composition. In addition to its dietary importance, potato has attracted increasing scientific interest in recent decades because of its complex phytochemical profile and potential health-related biological activities. Modern research has demonstrated that potato tubers contain essential nutrients, including vitamin C, B-complex vitamins (B1, B2, B6), potassium, magnesium, phosphorus, and iron, as well as a variety of secondary metabolites such as polyphenols and flavonoids. These compounds are associated with antioxidant, anti-inflammatory, vasoprotective, and immunomodulatory effects, indicating that potato may function not only as a staple food but also as a potential functional food with supportive therapeutic value. Alongside its nutritional significance, potato has a long history of use in traditional and ethnomedicinal practices. Folk medicine sources describe the external application of raw potato for minor burns, where its cooling and moisture-retaining properties may provide temporary analgesic and soothing effects. Similarly, sliced or grated potato is traditionally used to reduce localized swelling and periorbital edema. In respiratory conditions such as colds and coughs, inhalation of steam from boiled potatoes has been widely practiced as a home remedy for symptomatic relief, although caution is required due to the risk of thermal injury. Potato juice has also been traditionally used for gastrointestinal discomfort, particularly gastritis and dyspepsia, owing to its perceived mucosal protective effects. In dermatological folk practices, potato-based applications are used for skin hydration, irritation relief, and cosmetic purposes. Despite its widespread

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traditional use, evidence-based medicine requires critical evaluation of its efficacy and safety. While experimental studies indicate potential beneficial bioactivities, clinical evidence remains limited and inconsistent. Moreover, the presence of glycoalkaloids such as solanine and chaconine in green or sprouted potatoes represents a toxicological risk, as these compounds may cause neurological and gastrointestinal disturbances at elevated concentrations. Variability in cultivar type, storage conditions, and processing methods further affects the stability and concentration of bioactive compounds. Therefore, this study aims to systematically analyze the phytochemical composition, pharmacological potential, and ethnomedicinal applications of potato based on current scientific literature, while critically assessing its benefits and safety within an evidence-based medical framework.

MATERIALS AND METHODS.

This study systematically analyzes the phytochemical composition, biological activities, and traditional medicinal applications of the potato (Solanum tuberosum L.). The literature review was conducted using high-impact international databases, including Scopus, Web of Science, and PubMed, focusing on peer-reviewed publications from 2015 to 2025. Additional sources included monographs in pharmacognosy, food biochemistry, and clinical phytotherapy. The selected studies were evaluated based on methodological quality, scientific reliability, citation impact, and adherence to peer-review standards. The reviewed literature highlights the major bioactive constituents of potato, including ascorbic acid (vitamin C), B-complex vitamins (B1, B2, B6), potassium, magnesium, phosphorus, iron, as well as secondary metabolites such as polyphenols and flavonoids. Their antioxidant, anti-inflammatory, and immunomodulatory properties were critically evaluated based on experimental and clinical evidence. Special attention was given to glycoalkaloids, particularly solanine and chaconine, regarding their toxicokinetic properties, dose-dependent toxicity mechanisms, and safety thresholds.

The methodological framework followed a PRISMA-aligned systematic literature review approach, combined with comparative analysis, thematic coding, and content analysis techniques. The selected studies were categorized according to quality and thematic relevance, enabling an integrative assessment of the therapeutic potential and safety profile of potato-derived bioactive compounds. The findings indicate that potato bioactive constituents exhibit significant antioxidant, anti-inflammatory, gastroprotective, and immunomodulatory effects. However, due to limited clinical evidence, their therapeutic application should be strictly guided by evidence-based medicine (EBM) principles and standardized safety parameters.

RESULTS AND DISCUSSION.

The analyzed scientific literature in this study indicates that potato (Solanum tuberosum L.) possesses significant biological and pharmacological potential. Based on the reviewed sources, it was found that the main bioactive components of potato--vitamin C, B-complex vitamins, potassium, magnesium, phosphorus, iron, as well as polyphenols and flavonoids-exert strong antioxidant and anti-inflammatory effects in the human body. These compounds play an important role in reducing oxidative stress, protecting cell membranes, and supporting immune system function. The results also show that potato extracts and their natural forms have demonstrated gastroprotective effects in several experimental studies, indicating their potential to protect the gastric mucosa and reduce inflammatory processes. In addition, traditional applications such as raw potato compresses and steam inhalation have been reported to provide symptomatic relief. During the discussion, it was noted that although potato has promising therapeutic potential, the clinical evidence regarding its effectiveness remains insufficiently standardized. In particular, significant variations exist among studies in terms of dosage, extraction methods, and

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modes of application, which complicate the comparison of results. Furthermore, it has been confirmed that glycoalkaloids present in potatoes-solanine and chaconine-may exhibit toxic effects at high concentrations. Excessive intake of these compounds may negatively affect the central nervous system and the gastrointestinal tract, potentially leading to intoxication. In vitro potato microtubers and their relevance to pharmaceutical sciences. Microtubers of Solanum tuberosum produced under in vitro conditions represent a highly controlled biological system widely utilized in plant biotechnology, secondary metabolite research, and pharmaceutical exploration. 1. Phytochemical profile and biomedical relevance. In vitro-derived tubers accumulate a spectrum of specialized (secondary) metabolites, including: Phenolic acids (e.g., chlorogenic acid derivatives). Flavonoid compounds**.** Steroidal glycoalkaloids (notably solanine and chaconine)**.** Biomedical implications: Phenolic constituents exhibit potent free radical scavenging (antioxidant) activity**,** relevant to oxidative stress-related pathologies. Flavonoids demonstrate anti-inflammatory, vasoprotective, and cardioprotective bioactivities via modulation of enzymatic and signaling pathways. Glycoalkaloids have been reported to exert membrane-disruptive, antimicrobial, and putative cytotoxic effects on tumor cell lines**,** primarily in vitro. 2. Regulation of secondary metabolism by plant growth regulators. The biosynthesis and accumulation of metabolites in vitro are strongly modulated by plant growth regulators (PGRs), including: Auxins (IAA, NAA, 2,4-D). Cytokinins (BAP, kinetin). Gibberellins (GA_3). Mechanistic effects: Alteration of carbon flux distribution between primary and secondary metabolism**.** Regulation of phenylpropanoid pathway activity. Modulation of alkaloid biosynthetic gene expression. Pharmaceutical significance**.** Controlled PGR regimes enable: Enhanced production of target phytochemicals. Standardization of bioactive compound yield. Optimization of metabolic engineering strategies. 3. Biotechnological and pharmaceutical applications. In vitro microtubers provide a valuable platform for: Production of pathogen-free clonal plant material. Establishment of genetically uniform experimental systems. Scalable production of phytochemicals for pharmacognostic applications. Key applications: Source material for plant-derived drug discovery pipelines. Standardized extraction of bioactive metabolites. Model system for metabolic engineering and synthetic biology approaches.

4. Toxicological considerations. Despite their biotechnological value, glycoalkaloid accumulation remains a critical safety parameter. Dysregulation of in vitro culture conditions may lead to: 1. Elevated steroidal glycoalkaloid biosynthesis. 2. Increased membrane toxicity and neurotoxic potential 3. Reduced suitability for downstream pharmaceutical utilization.

Table 1. Effect of hormone combinations on regeneration type (% efficiency): comparison across genotypes

Variety	Most effective hormone combination	Shoot regeneration (%)	Leaf regeneration (%)
Sarnav	BAP 1,0 + NUK 0,2 + GA_3.0,5	90	82
Sante	BAP 1,0 + NUK 0,2 + GA_3.0,5	88	78
Qayroqi	BAP 1,0 + NUK 0,2 + GA_3.0,5	85	75

The study demonstrated that the most effective plant growth regulator combination for direct in vitro regeneration of potato genotypes is BAP 1.0 mg/L + NAA 0.2 mg/L + gibberellin (GA_3) 0.5 mg/L. Under this hormonal regime, regeneration efficiency reached 85–90% in stem segments and 75–82% in leaf segments, respectively. In contrast, zeatin-based combinations were identified as an alternative approach that promotes simultaneous formation of both shoots and roots, making them suitable for balanced organogenesis and plantlet development.

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CONCLUSIONS

This study investigated the influence of plant growth regulator combinations on morphogenetic responses and regeneration efficiency in in vitro cultures of Solanum tuberosum, with particular emphasis on its biotechnological and ethnopharmacological potential. Experimental results demonstrated that the combination of BAP 1.0 mg/L + NAA 0.2 mg/L + GA_3 0.5 mg/L exhibited the highest organogenic induction efficiency, achieving regeneration rates of 85–90% in stem segments and 75–82% in leaf segments**.** These findings indicate a strong synergistic interaction between cytokinin-auxin balance and gibberellin signaling pathways, which collectively enhance cellular dedifferentiation and promote de novo organogenesis. Furthermore, potato tubers contain a diverse range of secondary metabolites, including phenolic compounds, flavonoids, and steroidal glycoalkaloids (notably solanine and chaconine), which define their bioactive phytochemical profile. Literature evidence suggests that these compounds exhibit antioxidant, antimicrobial, and cytotoxic activities, primarily validated under in vitro and experimental conditions. Such properties may partially support the pharmacological basis of traditional medicinal applications of potato-derived preparations. Overall, in vitro regeneration systems serve not only as efficient platforms for clonal micropropagation and genetic uniformity maintenance but also as robust model systems for studying secondary metabolite biosynthesis, phytochemical modulation, and pharmacological potential. These findings provide a methodological framework for further investigation of morphogenetic plasticity and the bioresource potential of potato as a candidate for biotechnological and pharmaceutical applications.

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