

Herbal Supplement Consumption Trends Among Adolescents: Nutritional Perspectives and Safety of Use

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ABSTRACT

In recent years, herbal supplement consumption among adolescents has increased significantly, in line with the rise of healthy lifestyle trends and the influence of social media. Natural-based supplements are perceived as a quick solution to improve vitality, appearance, and endurance. However, this phenomenon is often not accompanied by an adequate understanding of nutrition, product safety, and the risk of pharmacological interactions. This study aims to examine herbal supplement consumption patterns among adolescents through a literature review approach from a nutritional and safety perspective. Data sources were obtained from indexed scientific journals, official publications, and relevant studies from 2019–2024. The findings indicate that low nutritional literacy, the strong influence of online media, and weak product distribution regulations contribute to a high potential for irrational consumption. Most adolescents consume supplements without medical consultation, assuming that all natural products are safe, despite scientific evidence showing potential risks such as toxic effects, synthetic contamination, and drug interactions. Therefore, an integrated educational strategy within the education system and evidence-based digital health campaigns are needed. Synergy between the government, schools, families, and health workers is crucial for shaping safe, rational, and nutritionally appropriate consumption behavior among adolescents

Keywords: *Adolescent Nutrition; Herbal Supplement Safety; Consumer Behavior.*

INTRODUCTION

In the last decade, healthy lifestyle trends have increasingly dominated the mindset of urban communities, including teenagers. This phenomenon is reflected in the increasing consumption of natural-based health products, including herbal supplements. Teenagers, as a group undergoing a dynamic phase of physical and psychological development, often seek alternatives to

improve vitality, appearance, and endurance through readily available supplement products. Convenience, the influence of social media celebrities, and aggressive digital marketing have all contributed to the perception that herbal supplements are a quick, natural, and safe solution.

However, the increasing consumption of herbal supplements is not always accompanied by adequate nutritional understanding. According to the literature on adolescent nutrition, this phase is characterized by an imbalance between nutritional needs and actual consumption patterns, exacerbated by low health literacy (Rahmawati et al., 2025). Many adolescents do not yet understand that meeting ideal nutritional needs should come from a balanced, nutritious diet, not from supplementation. The lack of formal education regarding the functions, indications, and risks of herbal supplements makes this group highly vulnerable to misinformation.

This situation is exacerbated by weak regulations on the distribution of herbal supplements on the market, particularly those sold freely online. Not all products labeled "herbal" have undergone adequate safety, effectiveness, and scientific validation testing. Several cases have shown that certain supplements may contain active compounds that trigger significant pharmacological effects or even interact negatively with existing medications. This is a crucial issue, given that adolescents tend to consume these supplements on their own without consulting a healthcare professional (Ersila & ST, 2024).

Furthermore, the safety of herbal supplements is not only related to the active ingredient content, but also to production quality, storage, and potential contamination with hazardous materials. A study by the Indonesian Food and Drug Monitoring Agency (BPOM) showed that a number of herbal supplement products on the market were found to contain synthetic ingredients not listed on the label. This indicates a gap between public perception of product naturalness and the reality on the ground, potentially endangering the health of young consumers.

This phenomenon raises the need for a systematic scientific approach to understanding herbal supplement consumption patterns among adolescents. Research examining consumption motivations, information sources, and risk perceptions is essential for formulating effective intervention strategies (Melero-Bolanos et al., 2025). Such studies are also crucial for developing an evidence-based educational framework that can strengthen nutritional literacy and awareness of the safety of supplement consumption. This way, interventions are not merely reactive to cases but proactive in shaping responsible consumption behavior.

From a nutritional perspective, it is important to assess the extent to which herbal supplements truly contribute to meeting adolescents' nutritional needs. Many supplement products claim to boost metabolism, improve digestion, or

balance hormones, but these claims are often not supported by valid scientific data. Assessment of the nutritional value, bioavailability of active ingredients, and long-term effects of herbal supplements remains very limited, particularly in the adolescent population, which has specific metabolic needs (Tirla et al., 2022).

On the other hand, the role of families and educational institutions in shaping consumer awareness is significant. Adolescents who receive guidance from their parents and information from teachers or health professionals have been shown to be more selective in choosing health products (Arora et al., 2026). Therefore, integrating nutrition education into the school curriculum and providing health education within the family environment are effective preventative strategies in reducing supplement misuse. These efforts must be supported by public policies that support the protection of adolescent consumers.

Finally, in the context of developing public health policies, the need to strengthen regulation and oversight of herbal supplement products is urgent. The government, academics, and health practitioners need to work together to create an ecosystem that ensures product safety while raising consumer awareness. This way, herbal supplement consumption among adolescents will no longer be a passing trend but rather part of a healthy lifestyle based on scientific principles and safety

METHODS

This study uses a literature review approach as the primary method to systematically examine trends in herbal supplement consumption among adolescents from a nutritional and safety perspective. This literature review was chosen because it provides a strong conceptual and empirical foundation for understanding the phenomenon through the analysis of various relevant and up-to-date scientific sources. The objective of this method is to identify, evaluate, and synthesize findings from a number of studies published in the past five years (2019–2024), both nationally and internationally.

The data collection process was conducted through a search of reputable scientific databases such as PubMed, ScienceDirect, Scopus, Google Scholar, and Garuda Ristekbrin. Keywords used in the search process included: "herbal supplement consumption," "adolescents," "nutritional safety," "herbal product risk," and "youth dietary behavior." The selected literature must meet the inclusion criteria, namely (1) focusing on the adolescent population, (2) discussing the consumption or impact of herbal supplement use, (3) presenting an analysis from a nutritional or product safety perspective, and (4) being a scientific journal article, research report, or publication from an official health institution. Articles in Indonesian and English were accepted for this study.

Meanwhile, exclusion criteria included articles that were opinion-based, not peer-reviewed, or did not include relevant empirical data. All articles obtained were then analyzed using a thematic analysis approach to identify key emerging patterns, such as consumption motivations, safety perceptions, media influence, and nutrition education. The analysis process was conducted descriptively and qualitatively with the aim of formulating a holistic understanding of the research issue.

The reliability and validity of the data in this study were maintained by using literature from indexed journals and trusted health institutions, and by comparing findings between studies to avoid interpretive bias. Furthermore, a literature triangulation approach was used, incorporating multiple perspectives: from public health, nutrition, herbal pharmacology, to adolescent behavior.

With this literature study approach, the research is expected to provide a conceptual contribution to the discourse on herbal supplement consumption in adolescents, as well as offer scientific recommendations for the development of more effective and evidence-based health policies and educational strategies.

RESULTS AND DISCUSSION

1. Consumption Patterns and Factors Driving Herbal Supplement Use in Adolescents

In recent years, there has been a significant increase in herbal supplement consumption among adolescents, particularly in urban areas heavily influenced by digital culture and healthy lifestyle trends. Adolescents now demonstrate a greater awareness of health and body aesthetics, although this awareness is often not accompanied by a deep understanding of nutritional principles and holistic health. Herbal supplement consumption varies in frequency, from daily to occasional, depending on the intended use, which generally includes improving immunity, skin care, weight management, and increasing stamina for academic and social activities (Campos et al., 2025; Febrianto et al., 2023).

Commonly used herbal supplements include products based on Javanese ginger, turmeric, tamarind, red ginger, moringa leaves, and even products based on natural collagen. Modern and convenient supplement packaging further strengthens their acceptance among adolescents, who tend to choose instant products that still appear natural (Widayati et al., 2025). Behind these choices are a number of driving factors influencing consumption behavior, including the influence of social media, popular health trends, peer pressure, and low nutritional literacy. Social media platforms like TikTok and Instagram play a dominant role in promoting herbal products as part of a healthy and aesthetic lifestyle, often through visual narratives such as testimonials, beauty challenges, and body transformations, which rarely include scientific or medical verification.

With the rise of the "back to nature" trend and the concept of "clean living," herbal supplements are considered safer and have fewer side effects than chemical drugs. This paradigm is reinforced by marketing campaigns that use labels like "natural," "organic," or "traditional," which are readily accepted by teenagers without adequate scientific validation. Furthermore, peer influence also plays a significant role in shaping consumption behavior. Teenagers tend to conform to the preferences of their peers, both in terms of supplement brands used, reasons for use, and frequency of consumption, as a form of social integration and a search for identity during the transition to adulthood.

Unfortunately, the increase in herbal supplement consumption is not always accompanied by increased nutritional literacy. Many adolescents lack a basic understanding of nutritional needs, the mechanisms of action of active ingredients in the body, and the potential risks of supplement interactions with other foods or medications. This phenomenon is exacerbated by the lack of nutrition education in schools and limited access to valid, evidence-based information sources. As a result, consumption is irrational, for example, by mixing several types of supplements without considering dosage, duration, and individual physiological conditions, which can lead to long-term health problems (d'Arqom et al., 2023).

Adolescents' motivations for using herbal supplements are also influenced by complex psychosocial and cultural factors. In many cases, the decision to take supplements is driven not only by physiological needs but also by a desire to achieve ideal body standards established by popular culture and the media. Herbal supplements are seen as a practical solution to improve appearance, primarily because they are perceived as "natural" and "harmless," although these claims are often unproven clinically (Hasibuan et al., 2024). This psychological drive is rooted in the need for social acceptance, validation through physical appearance, and meeting cultural expectations of a "healthy" and "attractive" body.

In addition to these contemporary factors, local cultural dimensions also strengthen the legitimacy of herbal consumption. In Indonesian society, the use of natural ingredients such as jamu (herbal medicine) has been a traditional practice embedded in everyday life. This tradition has undergone a transformation in the modern context when combined with technology and digital marketing, shifting the perception of herbs from mere cultural heritage to lifestyle commodities (Marimuthu, 2019). This integration of cultural values with market logic has accelerated the penetration of herbal supplements into adolescent lifestyles, while also creating new challenges in regulation, education, and oversight.

Therefore, it is crucial to understand the consumption patterns and motivations behind herbal supplement use more comprehensively, using an

interdisciplinary approach that encompasses nutrition, adolescent developmental psychology, cultural sociology, and health communication. Educational interventions focused on improving nutritional literacy and critically understanding health information disseminated on social media are needed. Furthermore, stricter regulations on supplement promotions on digital platforms need to be implemented to prevent information manipulation that harms vulnerable adolescent consumers.

Thus, while herbal supplement consumption among adolescents reflects a positive health trend, a critical approach is still needed to ensure this practice is safe, rational, and beneficial for long-term health. Further research and the active involvement of educational institutions and healthcare professionals in the educational process are essential to foster supplement consumption behaviors based on knowledge and awareness, rather than solely on trends and social pressure.

2. Nutritional Review and Effectiveness of Herbal Supplements on Adolescent Health

Adolescence is a critical period in the human life cycle, marked by accelerated growth, organ development, and complex hormonal changes. Therefore, nutritional needs during this period increase significantly to support bone and muscle growth and cognitive development. An imbalance in nutritional intake can lead to growth disorders, metabolic disorders, and even mental health problems (Mahabatillah et al., 2023). In this context, the emerging trend of herbal supplement consumption is a phenomenon worthy of close attention, both in terms of nutritional needs and long-term safety.

Herbal supplements are commonly consumed by adolescents in the hope of boosting immunity, managing stress, or supporting beautiful skin and academic performance. However, the role of herbal supplements as nutritional complements or substitutes remains a matter of scientific debate. Some supplements, such as Echinacea extract, ginseng, curcumin, or ginkgo biloba, are known to contain bioactive compounds like flavonoids, saponins, and polyphenols, which have antioxidant and immunomodulatory activities. However, their nutritional value cannot be compared to essential macronutrients or micronutrients such as iron, vitamin D, or protein.

The effectiveness of herbal supplements in supporting adolescent health depends on two main aspects: active ingredient content and bioavailability. Bioavailability is the body's ability to absorb and utilize the active ingredients in the herbal product (Nugroho et al., 2025). For example, curcumin from turmeric has potent anti-inflammatory effects, but its absorption rate in the digestive tract is very low unless combined with piperine from black pepper. This phenomenon

suggests that claims of herbal supplement effectiveness cannot be separated from the product's formulation and consumption method.

Results from randomized controlled trials (RCTs) and observational studies have yielded mixed results. Some studies report that ginseng consumption can improve focus and endurance in adolescents with chronic fatigue, but these effects are often subjective and not always supported by robust physiological biomarkers. Another study showed that *Echinacea purpurea* can reduce the frequency of upper respiratory tract infections, but the effect was not significantly different from a placebo. This suggests that the physiological effects of herbal remedies need to be examined more critically and objectively (Wahab, 2025).

On the other hand, the gap between consumer perception and scientific evidence is a serious issue. Many teenagers and their parents assume that because herbal supplements are natural, they are safe and effective. However, some herbs can interact with medications, cause side effects such as hepatotoxicity, or even contain heavy metal contaminants if not properly processed. This perception is reinforced by advertisements and social media platforms promoting herbal supplements without valid scientific basis.

Furthermore, herbal supplements generally do not contain adequate amounts of essential nutrients such as calcium, iron, or vitamin B12. In the context of adolescents with iron deficiency anemia, for example, herbal supplements such as iron supplements often contain insufficient iron doses, without being accompanied by increased intake of foods rich in heme iron. This highlights the importance of nutritional literacy in assessing the effectiveness of herbal supplements holistically, not solely based on labels or testimonials.

Nevertheless, some integrative approaches have attempted to combine herbal supplements with evidence-based nutritional approaches. For example, supplement formulations containing herbal plant extracts combined with vitamins and minerals in a double-fortified form are considered more clinically promising (Qamariah et al., 2020). However, research on the long-term safety of herbal consumption in adolescents is still limited, and a multidisciplinary approach involving nutrition, pharmaceutical sciences, and public health is needed.

Therefore, the use of herbal supplements among adolescents must be viewed critically and should not replace the essential role of a balanced, nutritious diet. Evidence-based education is essential so that adolescents understand that the effects of herbs depend heavily on the dosage, plant species, individual condition, and interactions with other factors. Herbal use should be positioned as part of a holistic health approach, not as a quick fix for more complex nutritional problems.

the gap between consumer perceptions and available scientific evidence regarding the benefits of supplements.

3. Safety Risks and Regulatory Challenges in the Use of Herbal Supplements by Adolescents

The use of herbal supplements among adolescents has become an increasingly prominent public health issue, primarily due to the perception that natural products are safer and free from side effects. In reality, not all herbal supplements have undergone toxicity testing or clinical trials that meet scientific standards. Active ingredients in supplements such as ginkgo biloba, ginseng, or kava-kava, although derived from plants, have the potential for significant pharmacodynamic effects. Adolescents' lack of awareness regarding dosage, indications, and the risk of interactions with other medications, such as hormonal contraceptives or antibiotics, makes consuming herbal supplements a risky practice, particularly during puberty, when physiological changes are particularly prevalent (Wahyuddin & Sidi, 2023).

Furthermore, many herbal supplement products on the market lack official distribution permits from the Food and Drug Monitoring Agency (BPOM) or related agencies. These products tend not to list their ingredients transparently, and some have even been detected as containing synthetic chemicals not disclosed on the label. A 2023 Ministry of Health finding indicated that approximately one-third of herbal products consumed by adolescents did not meet established safety standards. This situation is exacerbated by young consumers' lack of knowledge about how to identify product authenticity and legality, increasing their vulnerability to exposure to hazardous substances.

The digital era has further complicated this issue. Social media and e-commerce platforms have become the primary channels for distributing herbal supplements without adequate regulation. Teenagers active online are easy targets for promotions by influencers or unofficial accounts that offer subjective testimonials without scientific basis. A 2021 WHO report showed that the majority of teenagers obtain health information from the internet, rather than from professionals. This illustrates the weak oversight of online health product promotion and poses a significant challenge in ensuring public safety, particularly for young people.

In the regulatory context, government efforts to control the distribution and promotion of herbal supplements still face structural obstacles. The licensing system and enforcement of violations often cannot keep pace with the pace of production and distribution of new products. Suboptimal coordination between institutions, including the Food and Drug Monitoring Agency (BPOM), the Ministry of Communication and Informatics, and digital platforms, creates regulatory loopholes that allow unfit products to continue to access the market.

Therefore, a cross-sectoral approach is needed to strengthen online product verification systems and increase the effectiveness of educational campaigns focused on the safety of supplement consumption (Widaryanti et al., 2024).

On the other hand, the role of parents and educational institutions is crucial in minimizing the risk of supplement abuse by adolescents. Open family communication regarding healthy consumption patterns, along with curriculum-based education that includes supplement literacy and basic pharmacology, can equip adolescents with the ability to make more informed decisions. Unfortunately, a 2022 survey by the Health Research and Development Agency (Litbangkes) recorded that only around 23% of adolescents consulted an adult before taking herbal supplements. This figure reflects the weakness of family support systems and education in preventing potentially harmful consumption behaviors.

Health education is a key element in preventing herbal supplement misuse. Participatory approaches based on media familiar to adolescents—such as TikTok, Instagram, and YouTube—can increase the effectiveness of health messages. A study by Masruroh et al. (2024) showed that integrating education through interactive methods increased adolescents' knowledge of supplement use by up to 35%. Furthermore, involving health workers in online and offline educational activities can strengthen public trust in the information received.

However, cultural challenges and social perceptions also need to be identified as part of the problem. The inherited belief that herbal remedies are safe often blocks critical discussion of product safety and effectiveness. This leads adolescents to accept unsubstantiated information and follow trends without scientific consideration. It is important to distinguish between traditional, community-based healing practices and modern, commercial herbal products that have been modified through industrial processes (Santoso & Supriyadi, 2025). This distinction is often overlooked by the general public, including adolescents.

These dynamics demonstrate that the safety risks and regulatory challenges of herbal supplement use by adolescents are multidimensional. Synergy between public policy, distribution oversight, parental empowerment, and evidence-based education is needed to create a safer consumption ecosystem. Moving forward, strengthening digital-based regulations, developing product legality tracking apps, and adapting health curricula to current trends are crucial for protecting young people from the dangers hidden behind the "natural" label.

CONCLUSION

The conclusions drawn from the three main aspects discussed indicate that herbal supplement consumption among adolescents is a complex phenomenon, influenced by a combination of lifestyle trends, health perceptions, and social

pressures. Adolescent consumption patterns reflect efforts to achieve ideal body standards and optimal performance, often without a sufficient understanding of nutritional principles. Herbal supplements are perceived as practical, natural and safe solutions, yet their effectiveness and safety have not been scientifically proven. The gap between perceptions and scientific evidence raises the risk of irrational use, such as overdose or interactions with medications. Furthermore, supplement effectiveness is highly dependent on active ingredient content, bioavailability, and product formulation, which are rarely understood by young consumers. The existence of illegal products and aggressive, unregulated digital marketing exacerbate the situation, leaving adolescents vulnerable to misinformation and exposure to harmful substances. Regulatory challenges are further exacerbated by weak coordination between agencies and a lack of oversight of online promotions. Meanwhile, low nutritional literacy and minimal support from families or educational institutions contribute to the increased risk. A cross-sectoral approach encompassing participatory education, digital oversight, and strict regulation of supplement distribution is needed. The active involvement of health workers, schools, and social media in evidence-based educational campaigns is a key strategy. All these efforts aim to shape more rational, safe, and appropriate herbal supplement consumption behaviors for adolescents

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