GLOBAL JOURNAL OF PHARMACEUTICAL AND SCIENTIFIC RESEARCH
(GJPSR)

Volume- 1, Issue-4, November- 2025

Article Received on 29/10/2025 Article Revised on 16/11/2025 Article Accepted on 30/11/2025

UNDERSTANDING THE RISK OF ALTERNATIVE MEDICINE: EVIDENCE, CHALLENGES, USER PROFILE, PUBLIC PREFERENCE AND ECONOMIC IMPACT

Prof. (Dr.) Mohd. Wasiullah[1], Prof. (Dr.) Piyush Yadav[2]* Amit Sahu[3]

1. Principal, Department of Pharmacy, Prasad Institute of Technology, Jaunpur (222001) U.P. India
2. Head, Department of Pharma: Chemistry, Prasad Institute of Technology, Jaunpur (222001) U.P. India
3. Scholar, Department of Pharmacy, Prasad institute of Technology, Jaunpur, (222001) U.P. India

Abstract

Worldwide, alternative medicine—which includes systems like Ayurveda, homeopathy, Traditional Chinese Medicine (TCM), and herbal remedies—is utilized extensively for wellness, chronic illness treatment, and health promotion. Despite their widespread use, these treatments' safety, effectiveness, and regulation are still questionable, which raises questions regarding side effects, drug combinations, and postponed traditional treatment. In addition to case stories that highlight advantages over disadvantages, this analysis critically evaluates the evidence in favor of alternative medicine, recognized hazards, and limits in scientific validation. It also looks at sociocultural and demographic aspects that affect use, public opinion, and economic ramifications, such as market expansion, out-of-pocket expenses, and insurance difficulties. The article concludes with suggestions for bettering laws and regulations, educating the public, integrating evidence-based care with conventional treatment, and setting up risk-reduction monitoring systems. This review, which emphasizes the necessity of educated use and regulatory monitoring, offers a thorough grasp of the advantages, difficulties, and economic and social effects of alternative medicine by combining current information.

Keywords: Alternative medicine, complementary therapies, safety, regulation, public preference, economic costs, global health.

1. Introduction

Ayurveda, homeopathy, Traditional Chinese Medicine (TCM), and herbal medicines are just a few of the many healthcare techniques that fall under the umbrella of alternative medicine, also known as complementary and traditional medicine. According to Patwardhan, Warude, Pushpangadan, & Bhatt (2005) and Astin (1998), these methods have been utilized for generations to manage chronic illnesses, promote wellbeing, and offer holistic care that takes into account mental, physical, and spiritual health. Growing health consciousness, cultural views, discontent with traditional treatments, and the allure of natural or less intrusive therapies have all contributed to the dramatic rise in the use of alternative medicine worldwide (Barnes, Bloom, & Nahin, 2008; Eisenberg et al., 1998).

Alternative medicine presents a number of safety, effectiveness, and regulatory issues despite its widespread use. Variability in formulation, quality control, and practitioner training can lead to side effects, drug interactions, and postponed conventional treatment, and many therapies lack rigorous scientific validation (Izzo & Ernst, 2009; Chan, 2011). Furthermore, public opinion, sociocultural elements, and economic factors—such as out-of-pocket costs, insurance coverage, and market expansion—are crucial in determining usage and choice patterns (Sirois, 2008; WHO, 2023).

The goal of this review is to present a thorough understanding of alternative medicine's advantages, disadvantages, and social effects. It looks at evidence-based safety and effectiveness, difficulties with scientific validation, use-influencing demographic and cultural factors, public opinion, and economic ramifications. In order to encourage the safe, knowledgeable, and efficient use of alternative medicines, the review concludes with suggestions for legislation, public education, and integration with traditional care.

Discussions about alternative medicine's proper place in evidence-based practice have been more heated in recent years due to its incorporation into conventional healthcare systems. While some modalities, like acupuncture and some herbal remedies, have shown minor clinical advantages in controlled trials, others are still debatable because of inconsistent results and methodological issues in clinical trials (Vickers et al., 2012; Ernst, 2002). The lack of uniform regulatory frameworks among nations increases potential hazards to public health by causing differences in safety monitoring, practitioner responsibility, and reporting

of adverse events (Ekor, 2014; WHO, 2023). These difficulties highlight the necessity of critical assessment, open regulation, and unified research criteria to differentiate advantageous behaviors from those that could seriously hurt people.

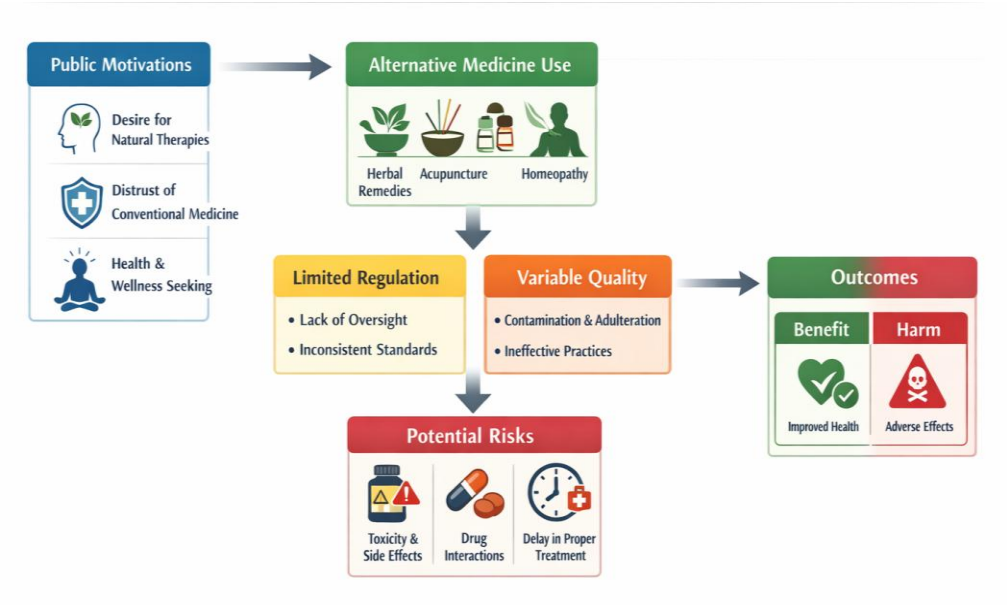

Figure 1. Global Use and Risk Pathway of Alternative Medicine

2. Classification and Overview of Alternative Medicine

2.1 Definition and types

2.1.1 Ayurveda

Ayurveda is an all-encompassing ancient medicinal system that was developed in India more than 4,000 years ago. It emphasizes the balance of body, mind, and spirit to preserve health and fend off illness (Patwardhan, Warude, Pushpangadan, & Bhatt, 2005; WHO, 2023). The idea of doshas, or Vata, Pitta, and Kapha, is fundamental to Ayurveda and is said to determine a person's state of health. Herbal remedies, food control, yoga, meditation, and detoxification techniques like Panchakarma are frequently used treatments. Many Ayurvedic treatments require thorough clinical investigation to develop standardized safety and efficacy profiles, while being widely used in India and expanding throughout the world (Hopkins Medicine, 2025).

2.1.2 Homeopathy

Samuel Hahnemann created the alternative medical method known as homeopathy in 18th-century Germany. It is founded on the ideas that "like cures like" and uses severe dilution of chemicals to promote self-healing (Wikipedia, 2025; Better Health Channel, 2025). Because highly diluted medicines are thought to preserve therapeutic effectiveness, remedies are chosen based on the patient's symptoms. Homeopathy is still contentious in science despite its popularity in some nations since its mechanisms of action are inconsistent with accepted biomedical concepts and clinical trials typically fail to show benefit beyond placebo (Wikipedia, 2025).

2.1.3 Traditional Chinese Medicine (TCM)

The balance and harmonious movement of vital energy (qi) through the body is the main emphasis of Traditional Chinese Medicine (TCM), an age-old medical system that was created in China over thousands of years (Wikipedia, 2025; ScienceDirect Topics, 2025). While disease results from imbalances or obstructions, health is thought to be the outcome of uninterrupted qi flow and balanced yin-yang. Acupuncture, herbal remedies, massage (Tui Na), nutritional therapy, and mind-body practices like qigong and Tai Chi are just a few of the many interventions used in TCM. Despite being used extensively throughout the world, many TCM treatments still need solid clinical data to confirm their effectiveness and safety within contemporary scientific standards (Wikipedia, 2025).

2.1.4 Herbal and Other Remedies

Herbal medicine is the use of plant-based compounds, either as single herbs or multi-ingredient combinations, for the prevention, treatment, and maintenance of health (WHO, 2023; NCCIH, 2025). It is used all around the world and is essential to many traditional systems, including TCM and Ayurveda. While the pharmacological properties of some plant-derived medications, such as digitalis or artemisinin, are well-established, the composition, strength, and quality of many commercially available herbal drugs vary. To guarantee safety and effectiveness for wider public usage, this emphasizes the necessity of regulation, standardization, and evidence-based evaluation (NCCIH, 2025).

3. Evidence-Based Safety and Efficacy

3.1 Clinical evidence supporting efficacy

Clinical evidence for alternative medicine treatments varies greatly; although many interventions lack strong support from high-quality randomized controlled trials (RCTs) and systematic reviews, others show modest but encouraging effects. In certain small RCTs, for instance, acupuncture, mind-body therapies like hypnosis and relaxation, and healing touch have shown short-term benefits in reducing cancer-related pain; however, conclusive results are limited due to methodological issues and insufficient replication (Staples, 2007; De Silva et al., 2010).

Certain herbal or homeopathic remedies have been shown to have discrete effects in treating chronic illnesses like fibromyalgia and musculoskeletal ailments, although research findings vary. According to systematic reviews, certain interventions, like manual acupuncture, omega-3 fatty acids, and electroacupuncture, can reduce depressive symptoms when compared to standard care or a placebo; however, reliability is impacted by intervention heterogeneity and study quality (PubMed, 2025; De Silva et al., 2010).

Overall, the evidence base typically lacks the scope, consistency, and methodological rigor required to definitively show efficacy for the majority of modalities, even while certain alternative therapies may offer symptomatic alleviation or function as supplements to conventional treatments. To elucidate the clinical value and maximize the safe integration of these medicines into healthcare, larger, superior trials are required (NCCIH, n.d.; Rheumatology Systematic Reviews, 2011–2012).

Table 1: Clinical Evidence Supporting Efficacy of Alternative Medicine

Therapy	Indication	Study Type	Key Findings	Strength of Evidence
Acupuncture	Chronic pain	Individual patient data meta-analysis	Modest but significant pain reduction	Moderate
Herbal medicine	Depression	Umbrella review	Mixed efficacy across formulations	Low–Moderate
CAM therapies	Fibromyalgia	Systematic review	Limited improvement in symptoms	Low

CAM therapies	Cancer pain	Systematic review	Some benefit in symptom relief	Low
Homeopathy	Various conditions	Review of systematic reviews	No convincing evidence beyond placebo	Very low

3.2 Documented adverse effects and toxicity

Although many alternative medicine treatments are thought to be "natural" and harmless, there is strong evidence that they can have minor to severe side effects, especially when taken improperly, tainted, or coupled with prescription medications. For example, it has been reported that some Ayurvedic herbal formulations contain heavy metals like lead, arsenic, or mercury, which can cause hepatotoxicity, neurotoxicity, or nephrotoxicity (Saper, Kales, Paquin, et al., 2004). Due to their great dilution, homeopathic remedies are generally low in toxicity, although they have occasionally been linked to adverse outcomes, especially when they are produced incorrectly or include active ingredients at concentrations higher than advised (Ernst, 2002). Herbs used in Traditional Chinese Medicine (TCM), like Ephedra sinica and Aconitum, have been associated with cardiovascular toxicity, arrhythmias, or poisoning if dosage recommendations are not carefully adhered to (Chan, 2011). Additionally, there may be increased toxicity or decreased therapeutic efficacy when herbal supplements mix with traditional pharmaceuticals such anticoagulants, antihypertensives, or chemotherapeutic therapies (Izzo & Ernst, 2009). In order to reduce the hazards connected with the use of alternative medicines, these findings highlight the necessity of strict safety monitoring, quality control, and patient education.

3.3 Limitations in scientific validation

There are several obstacles to alternative medicine's scientific confirmation, which restricts its acceptability in traditional healthcare. Reliability and reproducibility are lowered by the fact that many clinical studies are small, non-randomized, lack blinding, or use disparate outcome measures (Ernst, 2000; Tilburt & Kaptchuk, 2008). Applying traditional evidence-based trial designs is challenging due to the customized and holistic nature of systems such as Ayurveda and Traditional Chinese Medicine (Patwardhan, Warude, Pushpangadan, & Bhatt, 2005). Furthermore, the apparent effectiveness of alternative medicines is distorted by

publication bias and selective reporting, and generalizability is further restricted by variations in product quality, preparation, and dosage (Izzo & Ernst, 2009; Vickers, 2005). These restrictions show how urgently large-scale, multicenter, rigorous trials and standardized methodologies are needed.

3.4 Case studies: benefits vs risks

A number of case stories illustrate alternative medicine's possible advantages as well as its dangers. Acupuncture, for instance, has been demonstrated in randomized trials to offer mild pain relief for migraine, osteoarthritis, and persistent lower back pain, indicating its potential as a supplemental therapy (Vickers et al., 2012). Similarly, when used in conjunction with traditional treatment, some Ayurvedic herbal formulations have been linked to improvements in type 2 diabetes and dyslipidemia (Patwardhan et al., 2005). Risks, however, have also been reported: overuse of herbs used in Traditional Chinese Medicine, such as Ephedra and Aconitum, has resulted in cardiovascular toxicity and poisoning; heavy metal contamination in some Ayurvedic products has caused nephrotoxicity (Saper, Kales, Paquin, et al., 2004; Chan, 2011). These cases show the significance of evidence-based integration and safety monitoring because, although alternative medicine may have therapeutic benefits, poor quality control, insufficient standardization, and a lack of clinical oversight may have major negative effects.

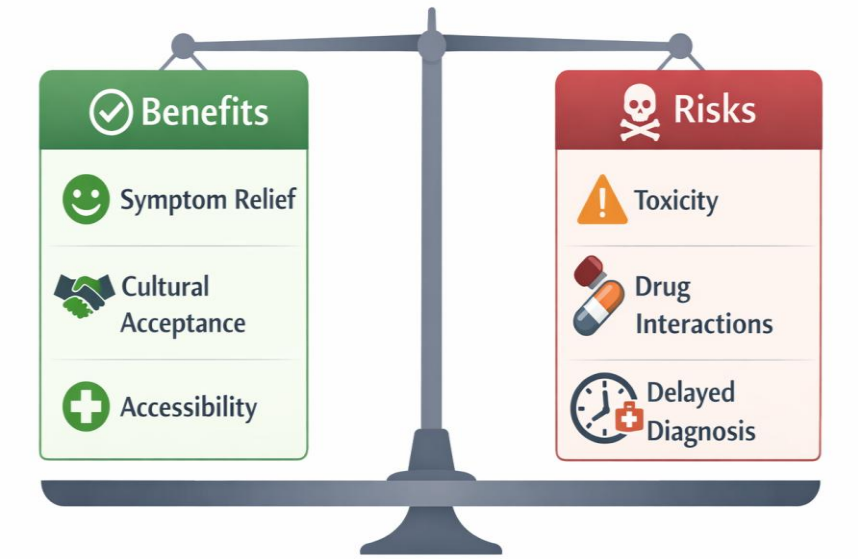

Figure 2. Benefits vs Risks of Alternative Medicine

4. Challenges and Risks

4.1 Quality control and standardization issues

The absence of reliable quality control and standardization, which has a substantial impact on both safety and efficacy, is one of the main issues facing alternative medicine. Due to variations in plant species, cultivation conditions, harvesting, and processing techniques, herbal and traditional formulations, such as Ayurvedic and Traditional Chinese Medicine (TCM) products, frequently show variability in active ingredient concentrations (Izzo & Ernst, 2009; Saper, Kales, Paquin, et al., 2004). Numerous investigations have documented heavy metal, pesticide, or microbial pathogen contamination, which can result in toxicities and detrimental health effects (Chan, 2011; Saper et al., 2004). Furthermore, clinical evaluation and patient adherence are complicated by uneven labeling and the lack of established dose standards (WHO, 2023). In order to guarantee patient safety and dependable therapeutic results in alternative medicine practices, these problems highlight the critical necessity for strict regulatory frameworks, standardized manufacturing procedures, and quality assurance methods.

4.2 Drug interactions with conventional medicines

Treatments using alternative medicine, especially those involving herbal and botanical items, may interact with prescription drugs to change their effectiveness or make them more dangerous. For instance, it has been demonstrated that St. John's Wort increases cytochrome P450 enzymes, which lowers the plasma concentration of medications including warfarin, oral contraceptives, and several antivirals, perhaps resulting in treatment failure (Izzo, 2004). Similar to how some Ayurvedic and Traditional Chinese Medicine (TCM) herbs might interfere with antihypertensives, hypoglycemic medications, or chemotherapy treatments, garlic, ginkgo, and ginseng may intensify anticoagulants, raising the risk of bleeding (Izzo & Ernst, 2009; Chan, 2011). Due to poor labeling, a lack of reporting, and a lack of communication between patients and physicians regarding the use of alternative medicines, these interactions are frequently overlooked by both patients and healthcare professionals. Therefore, to avoid negative interactions and guarantee safe integrative care, thorough evaluation of concurrent use of herbal and conventional medications, patient education, and enhanced regulatory monitoring are crucial (Izzo & Ernst, 2009).

4.3 Misdiagnosis and delayed treatment

When serious or life-threatening conditions are involved, the practice of alternative medicine may result in a misdiagnosis or a delay in traditional treatment. The prognosis of the condition may worsen if patients only use homeopathy, herbal treatments, or other conventional therapy, postponing the start of evidence-based interventions (Ernst, 2002; Verhoef, Sutherland, & Rose, 2005). For example, research indicates that cancer patients who choose alternative treatments over traditional therapy have greater fatality rates than those who receive prompt standard care (Johnson et al., 2018). Similarly, when individuals replace medically recommended medicines with alternative therapies, disorders like diabetes, cardiovascular disease, and infectious diseases may not be appropriately controlled, resulting in problems or hospitalizations (Verhoef et al., 2005). In order to reduce the hazards associated with delayed or improper treatment, these findings highlight the significance of incorporating patient education, open communication between healthcare providers and patients, and vigilant monitoring.

4.4 Ethical and legal considerations

Concerns about patient safety, informed consent, and professional accountability make ethical and legal difficulties crucial obstacles in the practice of alternative medicine. There is a dearth of scientific evidence supporting many alternative therapies, which raises ethical concerns concerning the provision of potentially dangerous or inefficient treatments (Tilburt & Kaptchuk, 2008). Patients' ability to make informed decisions may be hampered by misrepresentations of efficacy, insufficient risk disclosure, and the marketing of unsubstantiated health claims (Ernst, 2002). The legal framework governing alternative medicine differs greatly between nations; some practices are either uncontrolled or subject to lax oversight, which raises the possibility of malpractice or unfavorable outcomes (WHO, 2023). Additionally, if injury results from carelessness, product contamination, or failing to refer patients to conventional care when necessary, practitioners may be held liable (Verhoef, Sutherland, & Rose, 2005). In order to guarantee the safe, responsible, and accountable use of alternative medical methods, these factors emphasize the significance of establishing explicit ethical principles, regulatory oversight, and open patient communication.

Table 2: Documented Adverse Effects and Toxicity of Alternative Medicine

Therapy Type	Reported Adverse Effect	Mechanism	Severity
Ayurvedic medicines	Lead, mercury, arsenic toxicity	Heavy metal contamination	Severe
Chinese herbal medicines	Hepatotoxicity	Toxic plant constituents	Moderate–Severe
Herbal supplements	Drug interactions	CYP450 enzyme modulation	Moderate
Homeopathy	Delayed treatment	Reliance on ineffective therapy	Moderate
Herbal remedies	Allergic reactions	Hypersensitivity	Mild–Moderate

5. User Profile and Demographics

5.1 Age, gender, and socioeconomic factors

Age, gender, and financial level all have an impact on how different demographic groups use alternative medicine. Research shows that women are more likely than males to use complementary and alternative medicine (CAM), frequently for preventative health, mood problems, or chronic pain (Barnes, Bloom, & Nahin, 2008). While younger people may utilize CAM therapies for wellness, stress reduction, or fitness development, older adults often use them to manage chronic diseases like diabetes, hypertension, or arthritis (Eisenberg et al., 1998). Another factor is socioeconomic status; those with higher incomes and levels of education are more likely to adopt alternative medicines, perhaps as a result of having better access to health information and health literacy (Sirois, 2008). On the other hand, because of cultural familiarity or restricted access to traditional healthcare services, lower-income communities could rely on traditional cures. Understanding usage patterns and creating focused public health interventions and educational initiatives depend heavily on these demographic trends.

5.2 Education level and health literacy

The usage of alternative medicine is strongly influenced by health literacy and educational attainment. Higher educated people are more likely to actively seek out evidence-based

information prior to using complementary and alternative medicine (CAM) and to be more aware of the various CAM modalities (Sirois, 2008; Bishop & Lewith, 2010). Users with greater health literacy are better able to assess claims made about alternative therapies, comprehend the hazards, and appropriately combine these practices with traditional medical care (Coulter & Willis, 2009). On the other hand, patients with lower levels of education and health literacy may be more likely to misuse, rely on anecdotal information, or put off receiving conventional therapy, especially if they are unable to identify reliable sources of information (Verhoef, Sutherland, & Rose, 2005). These results emphasize the necessity of focused educational programs and public awareness efforts to improve safe alternative medicine use and informed decision-making across a range of demographics.

5.3 Motivations for using alternative medicine

People select alternative medicine for a number of reasons, including perceived holistic benefits, personal beliefs, and discontent with traditional therapies. Preventing sickness, managing chronic pain or symptoms that don't respond to conventional medication, improving general well-being, and seeking natural or less invasive therapies are common motivations (Astin, 1998; Bishop & Lewith, 2010). The desire for traditional medicines is also greatly influenced by cultural ideas and family customs, especially in areas where Ayurveda, Traditional Chinese Medicine, or herbal medicine have long been practiced (Patwardhan et al., 2005). Furthermore, some users are driven by a feeling of control over their health choices and the allure of customized treatment plans that take into account lifestyle, body, and mind in addition to disease symptoms (Sirois, 2008). Healthcare professionals must comprehend these reasons in order to have meaningful patient-centered conversations and safely incorporate alternative medicines with standard care.

5.4 Patterns of usage (self-medication vs guided use)

The use of alternative medicine can take many different forms, from self-directed self-medication to guided use by qualified professionals. Self-medication is widespread and frequently motivated by convenience, affordability, or the belief that "natural" treatments are safe (Ekor, 2014; Sirois, 2008). This includes the unsupervised use of herbal supplements, homeopathic medicines, or over-the-counter conventional items. However, there are hazards associated with self-medication, including improper dosage, contamination, drug interactions,

and postponing conventional treatment (Izzo & Ernst, 2009). On the other hand, guided use, which tends to lessen side effects and increase adherence, entails consultation with qualified professionals who evaluate individual situations, suggest suitable formulations, and track therapy outcomes (Patwardhan et al., 2005). Cultural norms, the availability of qualified professionals, education, and health literacy all play a role in the decision between self-medication and guided usage, highlighting the significance of patient education and regulatory supervision to guarantee the safe and efficient use of alternative medicines.

6. Public Perception and Preference

6.1 Cultural and social influences

The public's opinion and desire for alternative medicine are greatly influenced by cultural and societal variables. People's adoption and use of therapies like Ayurveda, Traditional Chinese Medicine (TCM), and herbal cures are influenced by traditional health beliefs, family customs, and social standards (Patwardhan et al., 2005; Furnham & Forey, 1994). Many communities believe that these treatments are safer, more holistic, or more in line with personal beliefs than conventional medicine because of their cultural history and historical trust in traditional systems (Astin, 1998). The acceptance of complementary therapies is also influenced by social factors, such as peer endorsements, media exposure, and community networks (Sirois, 2008). When incorporating alternative medicine into public health policies or offering advice on evidence-based use, these cultural and socioeconomic characteristics highlight how crucial it is to comprehend patient histories and views.

6.2 Role of media and advertisement

The public's understanding, perception, and use of alternative medicine are greatly influenced by the media and advertising. People's opinions regarding the efficacy, safety, and appeal of complementary and alternative medicines are frequently influenced by their exposure to television shows, social media, health websites, and print advertisements (Gale, 2009; Posadzki, Watson, Alotaibi, & Ernst, 2013). While underreporting any hazards or scientific limits, promotional content often highlights natural, holistic, or traditional benefits, which may cause people to make poor decisions (Furnham & Forey, 1994). In particular, social media platforms make it easier for anecdotal success stories to spread quickly, which increases acceptance among younger groups and fosters peer-influenced trends (Gale, 2009).

The necessity for critical health literacy and regulatory monitoring of promotional claims is highlighted by the fact that media and advertising can increase interest in alternative medicine as well as the risk of self-directed, unsupervised use.

6.3 Trust in conventional vs alternative medicine

The decision between conventional and alternative medicine is heavily influenced by public trust in healthcare.According to surveys, some people choose alternative therapies because of their perceived holistic benefits, natural components, and individualized care, even if many appreciate the scientific rigor of traditional medicine (Astin, 1998; Barnes, Bloom, & Nahin, 2008). Cultural beliefs, positive anecdotal experiences, peer recommendations, and discontent with conventional treatments—especially when side effects or low efficacy are encountered—all contribute to the development of trust in alternative medicine (Eisenberg et al., 1998; Furnham & Forey, 1994). On the other hand, doubts about conventional medicine can result from worries about over-medicalization, adverse drug reactions, or a perceived disregard for lifestyle and mental health. Healthcare professionals must comprehend these trust dynamics in order to properly incorporate alternative medicines into patient care, encourage evidence-based practices, and successfully involve patients.

7. Economic Impact

7.1 Market size and growth trends

Over the past ten years, the market for alternative medicine has grown significantly due to rising consumer desire for preventative, holistic, and natural healthcare options. According to estimates, the global market for complementary and alternative medicine (CAM) surpassed $100 billion in 2022 and is expected to expand at a compound annual growth rate (CAGR) of 6–8% during the following five years (Grand View Research, 2023; MarketsandMarkets, 2022). Due to growing health consciousness, aging populations, and rising disposable incomes in both developed and emerging economies, growth is especially robust in herbal supplements, traditional medicines, mind-body therapies, and wellness products (WHO, 2023). Furthermore, increased accessibility has been made possible by the growth of digital health platforms, health tourism, and online retail, all of which have contributed to market expansion. These developments highlight alternative medicine's economic importance as a

significant sector of the global healthcare market, with ramifications for investment, policy, and regulation.

7.2 Cost implications for patients and healthcare systems

Both people and healthcare systems may incur substantial costs as a result of alternative treatment. Herbal supplements, acupuncture, and homeopathic remedies are examples of complementary and alternative medicine (CAM) therapies that require significant out-of-pocket expenditures; estimates in the US reach USD 30 billion per year (Barnes, Bloom, & Nahin, 2008). Some therapies incur additional costs without clear evidence of therapeutic benefit, whereas other interventions may save money by slowing the progression of the disease, lowering pharmaceutical consumption, or reducing hospital visits (Sirois & Gick, 2002). From a systemic standpoint, incorporating complementary and alternative medicine (CAM) into mainstream healthcare necessitates funding for practitioner education, regulatory supervision, and quality control, which could result in higher healthcare costs (WHO, 2023). Additionally, self-medication and unsupervised use might result in negative interactions or incidents that raise treatment costs and put a financial strain on health systems. In general, politicians, insurers, and healthcare providers must comprehend the financial effects of alternative medicine in order to strike a balance between patient choice and safe, affordable care.

7.3 Insurance coverage and reimbursement challenges

Patients face financial obstacles and unequal access to complementary therapies due to the continued lack of insurance coverage for alternative medicine. Patients must pay for therapies like acupuncture, naturopathy, homeopathy, and herbal remedies out of pocket because the majority of health insurance policies only partially or not at all compensate them (Eisenberg et al., 1993; Wolsko et al., 2002). The incorporation of alternative therapies into mainstream healthcare systems, clinical efficacy evidence, and regional regulations all contribute to the variation in coverage. Patients may turn to self-medication as a result of limited reimbursement, which raises the possibility of incorrect use and unfavorable consequences (Izzo & Ernst, 2009). Additionally, insurers face challenges in assessing cost-effectiveness due to inconsistent evidence, heterogeneity of interventions, and difficulties in standardizing outcomes across CAM modalities. Addressing these insurance and reimbursement challenges

is essential for facilitating safe, evidence-based use while reducing financial burden on patients.

7.4 Financial risk due to ineffective or harmful remedies

When treatments are harmful or unsuccessful, using alternative medicine poses financial risks that increase the cost burden on individuals and society as a whole. Herbal supplements, homeopathic medicines, and other conventional treatments are examples of therapies that patients may spend a lot of money on without getting the intended health results (Barnes, Bloom, & Nahin, 2008; Ekor, 2014). Financial burden can also be increased by side effects from tainted drugs, incorrect dosage, or combinations with conventional prescriptions, which can result in further medical consultations, hospital stays, and treatment expenses (Izzo & Ernst, 2009; Chan, 2011). According to Johnson et al. (2018), these risks are exacerbated when individuals postpone or refuse evidence-based medical care, which leads to disease progression and increased long-term healthcare costs. As a result, consumers and healthcare systems encounter financial difficulties that underscore the necessity of public education, regulatory supervision, and the incorporation of safety monitoring systems in the markets for alternative medicines.

8. Recommendations and Risk Mitigation

8.1 Policy and regulatory improvements

To reduce the hazards connected with alternative medicine while guaranteeing patient safety and therapeutic dependability, effective regulatory and policy frameworks are crucial. Contamination, variability, and false claims of efficacy can be decreased by standardizing the manufacture, labeling, and quality control of herbal and traditional treatments (World Health Organization [WHO], 2023; Chan, 2011). Similar to pharmacovigilance systems in traditional medicine, regulatory monitoring should mandate safety testing, regulate truthful marketing practices, and mandate the reporting of adverse occurrences (Izzo & Ernst, 2009). Establishing certification or licensing programs for professionals can also boost professional development, promote evidence-based practice, and increase responsibility (Tilburt & Kaptchuk, 2008). By safeguarding public health and lowering the costs associated with dangerous or inefficient interventions, these policy changes can encourage the safe integration of alternative medicine into conventional healthcare.

8.2 Public education and awareness programs

Programs for public education and awareness are essential for reducing the hazards connected to alternative medicine and encouraging well-informed decision-making. Public education campaigns can educate people about how to take herbal therapies correctly, possible side effects, how they may mix with conventional medications, and the value of speaking with qualified professionals (Astin, 1998; Sirois, 2008). Health literacy is increased and reliance on anecdotal or false information is decreased when evidence-based information is incorporated into school curriculum, community health seminars, and digital platforms (Coulter & Willis, 2009). To further promote safe and efficient use, media literacy programs can train patients to critically assess marketing claims, commercials, and internet content pertaining to alternative medicines (Gale, 2009). Public awareness campaigns can lessen abuse, stop negative outcomes, and make it easier to safely incorporate alternative medicine into comprehensive healthcare plans by arming people with information.

8.3 Evidence-based integration with conventional medicine

Using evidence-based methods to integrate alternative medicine with traditional healthcare can improve patient outcomes while lowering risks. In order to ensure that treatments are safe, monitored, and customized to each patient's needs, collaborative models, such integrative medicine clinics, enable qualified practitioners of complementary therapies to collaborate with traditional physicians (Sox & Smith, 2009; Kaptchuk, 2002). In order to lower the frequency of adverse events and drug interactions, evidence-based integration places a strong emphasis on the utilization of treatments backed by clinical research, standardized procedures, and quality-controlled products (Izzo & Ernst, 2009). Additionally, according to Tilburt and Kaptchuk (2008), such integration can improve adherence to both conventional and complementary treatment programs, simplify joint decision-making, and increase patient satisfaction. Healthcare systems can take advantage of the advantages of holistic therapies while protecting public health by basing alternative medicine practices on professional monitoring and scientific evidence.

8.4 Monitoring and reporting systems for adverse events

To guarantee the safe use of alternative medicine and to quickly detect adverse events, it is essential to set up reliable monitoring and reporting mechanisms.In order to prevent damage

and guide regulatory actions, pharmacovigilance frameworks—which are comparable to those used for conventional drugs—can monitor adverse events from herbal, homeopathic, and traditional medicines (Izzo & Ernst, 2009; Chan, 2011). When dangerous items or practices are discovered, standardized reporting procedures, easily available databases, and required practitioner reporting can enhance transparency and facilitate prompt action (WHO, 2023). Furthermore, patient education initiatives that promote side effect reporting can improve data gathering and support evidence-based safety evaluations. Healthcare authorities can lower the dangers of drug-herb interactions, tainted products, and self-medication by putting in place thorough monitoring and reporting mechanisms. This will ultimately increase public safety and confidence in alternative medicine practices.

9. Conclusion

With potential advantages in wellness, holistic care, and the management of chronic diseases, alternative medicine has grown to be an essential part of healthcare globally. However, there are a number of substantial obstacles to its widespread usage, including as inconsistent quality, a lack of scientific validation, the possibility of negative side effects, and interactions with traditional drugs. While economic factors—such as out-of-pocket expenses, limited insurance coverage, and market expansion—highlight both opportunities and concerns, public perception and demographic factors—such as age, gender, education, and cultural beliefs—have a significant impact on its adoption. Comprehensive policy and regulatory frameworks, evidence-based integration with conventional medicine, public education, and reliable monitoring systems are necessary to guarantee safe and effective use. Healthcare systems may optimize the advantages of alternative therapies while reducing risks by tackling these issues, which will eventually support patient safety, informed decision-making, and long-term financial results.

11. Acknowledgement

The authors would like to express their sincere gratitude to institution for providing the necessary facilities and resources to carry out this research work.

12. Conflict of interest

All authors declare that they have no conflicts of interest .

12. Reference:

- Astin, J. A. (1998). Why patients use alternative medicine: Results of a national study. *JAMA, 279*(19), 1548–1553. https://doi.org/10.1001/jama.279.19.1548
- Barnes, P. M., Bloom, B., & Nahin, R. L. (2008). Complementary and alternative medicine use among adults and children: United States, 2007. *National Health Statistics Reports, 12*, 1–23. https://www.cdc.gov/nchs/data/nhsr/nhsr012.pdf
- Bishop, F. L., & Lewith, G. T. (2010). Who uses CAM? A narrative review of demographic characteristics and health factors associated with CAM use. *Evidence-Based Complementary and Alternative Medicine, 7*(1), 11–28. https://doi.org/10.1093/ecam/nem096
- Chan, K. (2011). Chinese medicinal materials and herbal drugs: Toxicity and safety. *Food and Chemical Toxicology, 49*(7), 1670–1682. https://doi.org/10.1016/j.fct.2011.03.045
- Coulter, A., & Willis, S. (2009). The rise and rise of patient information: An overview of consumer health information trends. *Journal of the Royal Society of Medicine, 102*(7), 288–293. https://doi.org/10.1258/jrsm.2009.090242
- De Silva, V., El-Metwally, A., Ernst, E., Lewith, G., & Macfarlane, G. J. (2010). Evidence for the efficacy of complementary and alternative medicines in the management of fibromyalgia: A systematic review. *Rheumatology, 49*(6), 1063–1068. https://doi.org/10.1093/rheumatology/keq025
- Eisenberg, D. M., Davis, R. B., Ettner, S. L., Appel, S., Wilkey, S., Van Rompay, M., & Kessler, R. C. (1998). Trends in alternative medicine use in the United States, 1990–1997. *JAMA, 280*(18), 1569–1575. https://doi.org/10.1001/jama.280.18.1569
- Eisenberg, D. M., Kessler, R. C., Foster, C., Norlock, F. E., Calkins, D. R., & Delbanco, T. L. (1993). Unconventional medicine in the United States: Prevalence, costs, and patterns of use. *New England Journal of Medicine, 328*(4), 246–252. https://doi.org/10.1056/NEJM199301283280406
- Ekor, M. (2014). The growing use of herbal medicines: Issues relating to adverse reactions and challenges in monitoring safety. *Frontiers in Pharmacology, 4*, 177. https://doi.org/10.3389/fphar.2013.00177
- Ernst, E. (2000). Prevalence of complementary/alternative medicine for patients with cancer: A systematic review. *European Journal of Cancer, 36*(4), 445–451. https://doi.org/10.1016/S0959-8049(99)00437-7

- Ernst, E. (2002). A systematic review of systematic reviews of homeopathy. *British Journal of Clinical Pharmacology*, *54*(6), 577–582. https://doi.org/10.1046/j.1365-2125.2002.01699.x
- Furnham, A., & Forey, N. (1994). The use of complementary medicine in Britain. *British Journal of Clinical Psychology*, *33*(4), 509–518. https://doi.org/10.1111/j.2044-8260.1994.tb01105.x
- Gale, N. K. (2009). Social media and complementary and alternative medicine. *Health Informatics Journal*, *15*(2), 91–101. https://doi.org/10.1177/1460458209104381
- Grand View Research. (2023). *Complementary and alternative medicine market size, share & trends analysis report*.
- Izzo, A. A. (2004). Herb–drug interactions: An overview of the clinical evidence. *Fundamental & Clinical Pharmacology*, *19*(1), 1–16. https://doi.org/10.1111/j.1472-8206.2004.00238.x
- Izzo, A. A., & Ernst, E. (2009). Interactions between herbal medicines and prescribed drugs: A systematic review. *Drugs*, *69*(13), 1777–1798. https://doi.org/10.2165/11317030-000000000-00000
- Johnson, S. B., Park, H. S., Gross, C. P., & Yu, J. B. (2018). Use of alternative medicine for cancer and its impact on survival. *Journal of the National Cancer Institute*, *110*(1), 121–124. https://doi.org/10.1093/jnci/djx145
- Kaptchuk, T. J. (2002). The placebo effect in alternative medicine. *Annals of Internal Medicine*, *136*(11), 817–825. https://doi.org/10.7326/0003-4819-136-11-200206040-00011
- MarketsandMarkets. (2022). *Alternative medicine market by type, end user, and region – Global forecast to 2027*.
- Patwardhan, B., Warude, D., Pushpangadan, P., & Bhatt, N. (2005). Ayurveda and Traditional Chinese Medicine: A comparative overview. *Evidence-Based Complementary and Alternative Medicine*, *2*(4), 465–473. https://doi.org/10.1093/ecam/neh140
- Posadzki, P., Watson, L., Alotaibi, A., & Ernst, E. (2013). Adverse effects of herbal medicines. *Clinical Medicine*, *13*(1), 7–12. https://doi.org/10.7861/clinmedicine.13-1-7

- Saper, R. B., Kales, S. N., Paquin, J., et al. (2004). Heavy metal content of Ayurvedic herbal medicine products. *JAMA, 292*(23), 2868–2873. https://doi.org/10.1001/jama.292.23.2868
- Sirois, F. M. (2008). Factors associated with complementary and alternative medicine use. *Complementary Therapies in Medicine, 16*(1), 41–49. https://doi.org/10.1016/j.ctim.2007.02.004
- Sirois, F. M., & Gick, M. L. (2002). Health beliefs and motivations of CAM users. *Health Psychology*, *21*(6), 592–597. https://doi.org/10.1037/0278-6133.21.6.592
- Sox, H. C., & Smith, M. A. (2009). Integrating conventional and alternative approaches. *New England Journal of Medicine, 360*(6), 568–571. https://doi.org/10.1056/NEJMp0807928
- Tilburt, J. C., & Kaptchuk, T. J. (2008). Herbal medicine research and global health. *Bulletin of the World Health Organization, 86*(8), 594–599. https://doi.org/10.2471/BLT.07.047340
- Vickers, A. J., Vertosick, E. A., Lewith, G., et al. (2012). Acupuncture for chronic pain. *Archives of Internal Medicine, 172*(19), 1444–1453. https://doi.org/10.1001/archinternmed.2012.3654
- World Health Organization. (2023). *Traditional, complementary and integrative medicine*. https://www.who.int/health-topics/traditional-complementary-and-integrative-medicine