

A Brief Survey on Alternative and Complementary Medicine with Special Reference to Safety, Toxins, and Toxicological Concerns

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Abstract

Alternative and Complementary Medicine (ACM) is a wide range of healthcare practices that may be used within or alongside conventional medicine, and many of these practices are rapidly becoming accepted and integrated into the modern healthcare system. In addition to traditional medicine systems (e.g., Ayurveda, Unani Medicine, Traditional Chinese Medicine, and Homeopathy), ACM includes practices that utilize natural remedies including herbal medicine, phytotherapy, naturopathy, acupuncture, yoga, and meditation. While these therapies are often perceived as natural, and therefore, safe, increasing evidence shows that some preparations may contain intrinsic toxins, toxic metabolites, heavy metals or other toxic contaminants, leading to organ toxicity and adverse clinical outcomes if not properly regulated. The ACM philosophy promotes wellness, holistic care, mind–body therapies, and the use of food and/or supplements to maintain health and prevent disease, but parallel attention is required on toxicological risk, dose, quality control and potential toxic herb–drug interactions. Acceptance of ACM is largely influenced by patient preferences as well as cultural and ethnomedical factors and access. There are serious concerns regarding the safety, effectiveness, quality assurance, and regulation of many ACM practices, including the presence of toxins and toxicants due to adulteration, misidentification of plants and environmental contamination. To successfully combine these types of therapies with conventional medicine requires evidence-based medicine as well as the evaluation of clinical outcomes and potential drug–herb interactions, including their toxicological profile. Protecting the health and well-being of the public and maximizing the positive aspects of integrative medicine will require the establishment of standardization, toxicological evaluation and regulatory frameworks.

Keywords: Adverse effects, alternative medicine, clinical outcome, complementary medicine, cultural, and ethnomedical practices, drug–herb interactions, global health practices, herbal medicine, integrative medicine, patient preference, public health impact, quality control, regulation, and standardization, safety, and efficacy, toxicity, toxicological risk, toxins, traditional medicine

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INTRODUCTION

Diagnosis, treatment, and prevention of disease have all advanced significantly in modern medicine. However, drawbacks like drug side effects, problems managing chronic illnesses, and expensive medical bills have prompted people to look into alternative treatment options. A variety of medical systems and therapies that emphasize natural, spiritual, and holistic approaches to health are included in the field of complementary and alternative medicine, or CAM. At the same time, the rapid expansion of CAM use has created new

questions for toxicology, particularly regarding the safety of long-term exposure to bioactive plant compounds, possible accumulation of toxic constituents and the presence of environmental contaminants in herbal preparations.

Alternative and Complementary Medicine (CAM) includes a variety of health care practices, products, and therapies that are not typically part of allopathic or conventional medicine. This includes systems such as Ayurveda, Homeopathy, Unani, Naturopathy, Traditional Chinese Medicine, acupuncture, yoga, meditation, herbal therapies, chiropractic, and more. CAM suggests a holistic system of health that considers physical health, mental health, and spiritual health, with an emphasis on enhancement of the body's natural healing capacities rather than simply treating symptoms. However, many herbal and mineral formulations used in these systems may contain pharmacologically active substances that behave as toxins at higher doses or in susceptible individuals, and in some cases heavy metals, such as lead, arsenic, and mercury, have been reported in traditional preparations, highlighting the need for toxicological monitoring [1–2].

In recent decades the use of CAM approaches and therapies has escalated worldwide, driven by dissatisfaction with allopathy, cultural views, perceived safety, and awareness of preventive health. Many patients look to CAM as a complement to modern medicine in search of a more “personalized” and integrative perspective on health. Governments and health organizations have begun to recognize the significance of CAM as it pertains to wellness guidelines, and they also promote research, regulation, and education in an effort to safeguard consumers from unsafe practices and products, as well as to provide beneficial therapies that are reliable. Within this process, assessment of toxic effects, adverse reactions, and herb–drug interactions have become a key component of policy and clinical decision-making.

The National Center for Complementary and Integrative Health (NCCIH) defines complementary and alternative medicine (CAM) as medical practices that were created outside of conventional or mainstream Western medicine. It encompasses both alternative (used in place of) and complementary (used in addition to) conventional treatments. From a toxicological point of view, these definitions underline that CAM therapies are not automatically free from risk, and that dose, duration of exposure and individual susceptibility determine whether a natural substance acts as a remedy or a toxin.

Despite its wide use, CAM faces challenges including poor scientific rigor, lack of standardized methods, and inadequate implementation into mainstream healthcare. Ethical concerns, practitioner competency, and variability in product quality also raise valid questions. However, research is continually looking into the therapeutic use of CAM to treat chronic illness, stress-related conditions, and to enhance quality of life. To conclude, CAM represents an evolving and integral field of global health, offering different perspectives on holistic health and a paradigm of integration with modern health systems using an evidence-based approach [3–4].

THE HISTORICAL CONTEXT

CAM has a long history globally. Traditional Chinese Medicine (TCM) practices date back 2,000 years. Ayurveda emphasizes harmony of body, mind, spirit. Homeopathy and naturopathy – natural remedies – developed in Europe [5]. Herbal medicine treats illnesses.

The origins of Alternative and Complementary Medicine (CAM) are embedded in our collective history, existing long before the development of modern biomedical science. Across the globe, ancient cultures developed their own healing systems based largely on observations, experiences, and an inherent belief in the connections between the mind, the body, and nature. These systems form the roots of what we now know as CAM.

For example, Ayurveda began in India over 3,000 years ago as a complete system of healthcare that focused on the balance among the elements of the body, diet, and lifestyle. Further, Traditional Chinese

Medicine (TCM), likely developed around the same time, focused on the flow of Qi (vital energy) through the body using methods such as acupuncture and herbal formulations. Ancient Egyptian, Greek, and Roman medical systems also highly influenced modern day CAM; for instance, Hippocrates is remembered as the “Father of Medicine,” and he promoted therapy methods centered on naturally occurring healing properties and woo, the weight placed on diet and lifestyle in the healing process is still observed to this day in CAM medical systems [6].

In the Middle Ages, healing practices were preserved and enhanced in Europe and the Islamic world through herbalism and spiritual healing. Scholars, such as Avicenna and his Canon of Medicine, influenced healing in both the Eastern and Western worlds. However, with the advent of modern scientific medicine in the 19th and 20th centuries, many of the practices that preceded modern medicinal great were marginalized or labeled “unscientific.”

In the second half of the 20th century, a renewed and global interest in holistic health and dissatisfaction with the limitations of conventional treatments fostered a re-emergence of CAM (complementary and alternative medicine). Movements grounded in natural living, yoga, meditation, herbal medicine, and the embrace of nature emerged. The World Health Organization (WHO) began to acknowledge that traditional medicine offers beneficial practices for primary health care and began to support research and the integration of evidence-based practices.

Today, CAM is still developing and upholds its central role in integrative medicine, melding ancient and traditional healing paradigms with contemporary research. This historical lens demonstrates humanity’s desire for harmony and healing through time and that health is more than the absence of disease, but also a state of being of the body, mind, and spirit [7–8].

CAM CLASSIFICATION

CAM can be divided into five main domains, per NCCIH.

Complementary and Alternative Medicine (CAM) encompasses a variety of health care practices and therapeutic systems that fall outside the normal scope of conventionally trained, licensed Western health care. The National Center for Complementary and Integrative Health (NCCIH) and many other health organizations organize the general body of CAM practice into broad categories based on their philosophy, techniques, and methods of application. Each category represents a particular worldview that embodies the different types of systems of healing methods that have been developed in cultures through time, the goal of which has been, in some form, to work towards the well-being of body, mind, and spirit [9].

Whole Medical Systems

Whole medical systems are a complete system of theory and practice developed independently of or alongside conventional medicine and based on long cultural traditions. The major examples of this type of CAM practice include the following practices:

- *Ayurveda*: Originating from the Indian subcontinent, Ayurveda is centered on balancing the body’s energies, or doshas, (Vata, Pitta, Kapha) utilizing diet, lifestyle, and botanical treatments.
- *Traditional Chinese Medicine (TCM)*: TCM may involve acupuncture, herbal therapy, and Tai Chi to rebalance the Qi (vital energy) in the body [10].
- *Homeopathy*: Homeopathy is a system of natural store medicines that operates on the principle of like cures like and involves the very diluted use of substances to stimulate the self-healing process.
- *Unani and Naturopathic Medicine*: Unani is based on balancing the body’s humors, and the practice of naturopathic medicine promotes self-healing through humane and systematic diagnostic methods, diet, lifestyle, and alignment with nature [11].

Mind-Body Interventions

These approaches recognize the strong connection between mental, emotional, and physical health. Techniques in this category seek to develop the mind's ability to influence bodily processes to enhance wellness. Some of these could include:

- Meditation, Yoga, Tai Chi, Qigong.
- Biofeedback and Hypnotherapy.
- Relaxation Techniques and Guided imagery.

Biologically-Based Therapies

These are therapies that provide natural substances as herbs, foods, vitamins, and supplements to support health and healing; they include:

- Herbal medicine and nutrition therapy.
- Dietary Supplements and Probiotics.
- Aromatherapy and traditional plant based remedies.

Body Manipulative Methods

These are methods that do involve manipulation, or movement, of body parts to re-establish normal function, relieve pain and enhance health. Some examples could be:

- Chiropractic therapy.
- Osteopathic manipulation.
- Massage therapy and Reflexology.

Energy Methods

Energy based therapies focus on the principle that all living beings have a vital energy that flows through their bodies, and in times of imbalance or blockage of flow symptoms can be experienced. The techniques in this category are designed to enhance the flow and harmony of energy and life force, some examples are:

- Reiki and Therapeutic touch.
- Magnet therapy and Qigong healing [12–13].

WORLDWIDE APPLICABILITY AND ACCEPTANCE

CAM has established itself as a part of global health systems, with its scope and acceptance developing rapidly in both developed and developing countries. Given its origins in ancient healing traditions, CAM has global importance because it addresses and considers health holistically – in physical, mental, emotional, and spiritual terms. Over the past few decades, CAM has gained attention in the mainstream for several reasons: limitations of conventional medicine, increase in chronic disease incidence, and increased demand for natural and preventive approaches to therapy [14].

Global Prevalence and Usage

The World Health Organization (WHO) estimates that in some Asian and African countries, up to 80% of the population utilizes traditional medicine as part of their primary healthcare. In India, traditional systems, such as Ayurveda, Yoga, Unani, Siddha, and Homeopathy, are officially recognized with a dedicated ministry (AYUSH) and included in the National Healthcare Programs. Within AYUSH programs, increasing emphasis is being placed on pharmacovigilance, detection of toxic adulterants, and quality control of herbal and mineral preparations to minimize toxin-related adverse events in the population. Similarly, Traditional Chinese Medicine (TCM) is a significant part of the Chinese public health system, with widespread use in hospitals alongside modern treatments.

In Western countries, CAM has increased significantly over the last 30 years. Studies in the US, UK, Canada, and Australia have found that 40% to 60% of adults have used at least one form of CAM therapy, for example, acupuncture, massage, or herbal supplements. The emerging awareness of lifestyle-related illness and dissatisfaction with conventional drug treatments have urged the general

public to pursue CAM as a means of achieving wellness, managing stress, and preventing chronic diseases [15–16].

Acceptance of CAM by Authorities and Institutions

Globally, governments, and health organizations are beginning to regulate and incorporate CAM into the official healthcare systems. The WHO has established strategies for traditional medicine (2014–2023) that promote safe, effective, and rational use of CAM. To assess safety and efficacy, many countries have formed regulatory bodies, training programs, and research centers focused on specific modalities. For example, universities in China offer degrees in Traditional Chinese Medicine, and AYUSH institutions in India conduct extensive clinical research for validating traditional formulations. In addition, some Western medical schools are adopting curricular changes, including integrative medicine courses that familiarize future providers with evidence-based CAM [17–18].

Scientific Research and Evidence-Based Practice

As the demand for CAM has risen, the scientific verification of CAM has become a specific focus for assimilation of this practice. Several clinical studies have explored acupuncture as an option for pain management, yoga as a method of stress management, and herbal remedies for chronic diseases and have produced positive results. Additionally, institutions, such as the National Center for Complementary and Integrative Health (NCCIH) in the USA, have funded studies that explore the mechanisms and outcomes of several CAM modalities. The emphasis on evidence-based verification of CAM origin has increased its credibility, and created integration in the practice of modern medicine clinical practice [19].

Challenges and Future Directions

Despite the general acknowledgment of CAM worldwide, challenges persist – such as unique regulations, lack of consistent acknowledgment of practice of modality, and concerns for product safety and provider competency. However, research is continually looking into the therapeutic use of CAM to treat chronic illness, stress-related conditions, and to enhance quality of life. To conclude, CAM represents an evolving and integral field of global health, offering different perspectives on holistic health and a paradigm of integration with modern health systems using an evidence-based approach [20].

ACTION MECHANISMS

Thus, how Complementary and Alternative Medicine (CAM) works is pretty complex and depends on the specific system, therapy, or ideas behind it. Regular medicine usually targets certain body parts or sickness signs, but CAM tries to get your whole self – body, mind, and spirit – back in sync. CAM's healing power comes from all sorts of things happening in your body and mind, working together to make you feel better and help you heal on your own.

A big part of CAM is getting your body back to its natural state. Systems like Ayurveda, Traditional Chinese Medicine (TCM), and Unani all believe in keeping things balanced inside. For instance, Ayurveda uses diet, herbs, and lifestyle tweaks to balance Vata, Pitta, and Kapha. TCM uses acupuncture, herbs, and exercises like Tai Chi to control Qi (your energy) flowing through your body. These approaches try to correct what's off, stop sickness, and get your body back on track [21].

Turn on Your Body's Ability to Heal Itself

One idea behind CAM is that your body can usually heal itself. Things like Naturopathy, Homeopathy, and Reiki try to get those natural processes going. For example, homeopathic stuff uses very diluted things that are thought to kick-start your body's defenses. Naturopathy helps you heal by changing what you eat, clearing out toxins, and tweaking your lifestyle to boost your body's energy [22].

How Neuroendocrine and Immune Systems Change

Things like meditation, yoga, and acupuncture can actually mess with your body's stress response and hormones. They seem to help chill you out by lowering stress hormones, kicking in your rest and digest system, and even boosting your immune system. Studies show they can reduce swelling, help your heart, and sharpen your thinking which proves that these alternative medicine tricks can really work on a physical level [23].

How Natural Compounds Work: Biochemically and in Pharmacology

So, herbal medicines, supplements, and essential oils get the job done with active bits that talk to receptors and enzymes inside you. Take curcumin in turmeric for example, it can lower swelling and prevent damage. And ginseng can boost your energy and immunity. A lot of these things work on different parts of you all at once, and they can help in many ways without causing too many bad reactions. Nevertheless, the same bioactive constituents that produce therapeutic effects may also exert toxic actions when the dose is excessive, when products are contaminated, or when they interact with conventional medicines. From the standpoint of toxins and toxics, understanding the dose-response relationship, organ-specific toxicity and potential for genotoxicity or hepatotoxicity of such natural compounds is essential for safe clinical use [24].

ENERGY HEALING

Reiki, Qigong, and Therapeutic Touch are types of energy healing. The basic idea is that when your body's energy is off, you get sick. People who do these therapies use their hands or just focus their minds to move or balance your energy, which helps you relax and feel better. We do not totally get how it works from a science point of view, but there are more proof that these practices can help with stress and your mood.

ADVANTAGES OF CAM

CAM, or Complementary and Alternative Medicine, is getting more popular worldwide because it has a lot to offer. It looks at the whole person and tries to prevent problems before they start. CAM works with regular medicine to give people more choices for staying healthy and dealing with sickness. Here's a quick look at why CAM is so great.

A Whole-Person View of Health

CAM is all about how your body, mind, and spirit link together. It looks at you as a whole person, not just at the symptoms or sickness you have. Taking this all-in-one view can really help you feel good and stay balanced over time [25–27].

Staying Healthy with Prevention and Wellness

A lot of these alternative medicine systems, like Ayurveda, Yoga, and Naturopathy, put prevention first. They encourage healthy habits, good food, less stress, and lifestyle changes to keep you from getting sick in the first place. It's all about taking charge of your own health.

Natural and Gentle Treatments

Alternative medicine mostly uses natural stuff – like herbs, plant stuff, oils, and healthy foods. So, it does not rely as much on man-made drugs. These treatments are usually gentle and have fewer bad side things than regular medicine [28–30].

Good for Long-Term Health Problems

Alternative medicine looks good for helping with long-term issues like arthritis, diabetes, high blood pressure, headaches, and feeling worried. Things like acupuncture, yoga, and herbal medicine can ease pain, help you move better, and make life better.

Less Stress and Better Mental Health

Practices like meditation, paying attention to the now, and breathing exercises are good at cutting down on worry, stress, and feeling down. They help you relax, feel steady, and think better, which is good for your mind and body.

Care That's All About You

Alternative medicine folks usually spend more time getting to know you – your life, feelings, and habits – before they suggest anything. This way of doing things builds a better relationship and makes you happier with your care.

Works Well with Regular Medicine

Alternative medicine can work with regular medicine to make treatments even better. Like, acupuncture, and herbs can help with chemo side things, and yoga can help you get better after surgery or being sick.

Easy on the Wallet and Easy to Find

In a lot of poorer places, old-fashioned medicine is still a cheap and easy way to get care. Herbal stuff and things you can do at home mean you do not have to rely on expensive modern treatments.

Fits with Your Culture and Beliefs

Alternative medicine often goes hand in hand with local beliefs and traditions. This makes people trust it more and feel like their healthcare makes sense and is in harmony with their lives. However, cultural acceptance should be balanced with careful assessment of toxicological safety, ensuring that traditional preparations are free from harmful levels of toxins, heavy metals or other toxicants [31–40].

RESTRICTIONS AND DIFFICULTIES

Complementary and Alternative Medicine (CAM) can be good for you and takes a whole-body approach; it has got some problems. These problems keep it from being totally accepted, backed by science, and part of regular healthcare everywhere. Things like not being the same everywhere, rules, proof it works, and what people think about it all get in the way.

Here's a Quick Rundown of The Main Issues

Not Enough Proof

One big thing is that we do not have a ton of solid scientific proof that CAM really does what it says it does. A lot of old-school stuff is based on stories and how people used to do things, not real clinical studies, so scientists are a bit skeptical. Plus, there are not always clear ways to test this stuff, which makes it hard to know for sure if it works [41–45].

Not the Same Every Time

Herbal medicines and natural stuff can be super different depending on where they come from and how much of the good stuff is actually in them. If companies do not have good standards, you could end up with stuff that's not pure or does not have the right amount of active stuff in it. This makes it hard to get approval for use and be sure it's safe.

Not Enough Rules

A lot of places do not have good rules for CAM practices or the people who do them. Without licenses and someone watching over things, people who are not qualified could mess things up or take advantage of others. Also, because the rules change from place to place, it's hard to make sure everything is safe and people are responsible [46–50].

Not Enough Training

The people who do CAM stuff do not always get the same training. This means the quality of care can be different. And because there are not good ways to say who's really qualified, it's hard for people to find someone who knows what they're doing. CAM training is not really part of medical school either, which makes it hard for different types of doctors to work together.

Hard to Mix with Regular Medicine

A lot of doctors and hospitals still like regular medicine better and do not really want to include CAM. Doctors often do not know much about CAM, so it's hard for them to talk to CAM practitioners. This makes it tough to create healthcare plans that use both types of medicine.

Not Enough Money for Research

Compared to drug companies, not much money goes to CAM research. Clinical trials are pricey, and companies are not that interested in stuff you cannot get a patent on. Without money, it's hard to do the research and come up with new ideas in CAM.

What People Think

Some people think CAM is weird or not based on science, which makes it less believable. Some cultures are all about Western medicine and do not want to try old-fashioned ways of healing. On the other hand, some people just believe in traditional stuff without really thinking about it, which can also be risky [51–52].

Bad Reactions

Some herbal stuff can cause allergies or mess with prescription drugs. If people do not know about this, it can cause problems. In toxicology terms, these reactions may include hepatotoxicity, nephrotoxicity, cardiotoxic effects or hematological toxicity, which can be serious when potent plant toxins or contaminated products are involved.

Information Problems

A lot of old knowledge is just passed down by word of mouth, so we lose important info. There are not many good computer databases or records, which makes it hard to do research and make good rules. This lack of systematic toxicological data on CAM products complicates risk assessment and regulatory control over toxins and toxics derived from natural sources [53–61].

COMBINING CAM AND TRADITIONAL MEDICINE

Mixing what people call Complementary and Alternative Medicine (CAM) with what we know as Traditional Medicine is getting more common and super important in healthcare all over the world. Both types of medicine want the same things: to help you feel good overall, keep you from getting sick, and help your body heal itself. Traditional Medicine is like old-school healing methods like Ayurveda, Unani, and Traditional Chinese Medicine (TCM). CAM is all sorts of other treatments like herbal stuff, acupuncture, yoga, homeopathy, and ways to connect your mind and body. When you put these together with regular medicine, it's called integrative medicine – a way to take care of your health that's balanced and based on what works [62–64].

What They Both Believe

CAM and Traditional Medicine both think it's important for your body, mind, and spirit to be in balance. They try to find out what's really making you sick instead of just treating the symptoms. They tell you to change how you live, eat right, chill out, and think about your spiritual side to stay healthy. Because they believe in the same things, it makes sense to mix them with modern science.

How They Help Each Other

Regular medicine is great for emergencies, surgeries, and diseases that spread. But CAM and Traditional Medicine are really good at helping with long-term sicknesses, getting better after being sick, and keeping you healthy in the first place. If you use both, you can get all sorts of treatments. Doctors can use modern tests and medicine, and you can also try natural stuff, yoga, or acupuncture to get better faster, feel fewer side effects, and just feel better in general [65].

Who's Supporting It

- Lots of countries are starting to mix CAM and Traditional Medicine into their normal healthcare.
- In India, there's a special group that looks after Ayurveda, Yoga, Unani, Siddha, and Homeopathy. They want these treatments to be part of the country's health programs.
- China is already mixing Traditional Chinese Medicine into hospitals. So, people can get both herbal treatments and regular medicine at the same time.

- In the United States, the United Kingdom, and Germany, they've started research centers and schools that focus on integrative health.

What's Good About Mixing Them

When you mix CAM, Traditional Medicine, and modern medicine, you get a lot of good stuff:

- You get medicine that's made just for you.
- Treatments work better and medicine does not make you feel as bad.
- You start taking care of yourself to stay healthy and think about your whole body.
- People respect different cultures and use old knowledge.
- More people can get healthcare, even if they do not have a lot of money.

What's Hard About Mixing Them

Even though it sounds good, mixing these types of medicine can be tricky. There are not always clear rules, it's hard to prove that they work with science, and some regular doctors do not really believe in them. Also, they all have different ways of figuring out what's wrong, doing research, and training people. To make it work, we need to find ways to prove that they're safe and have rules that everyone can follow.

What's Next

To really mix these types of medicine well, the government, scientists, and doctors need to work together. They need to do more research, create good training programs, and make sure everything is safe and high-quality. If we can talk to each other and trust each other, we can bring together old wisdom and modern science.

PROSPECTS FOR THE FUTURE

Complementary and Alternative Medicine (CAM) has gone from old-time healing and local customs to a real healthcare option worldwide. It is a whole-body way to feel good, with treatments that can go with or take the place of normal medicine. Lately, folks want healthcare that's natural and puts them first, so CAM is getting more popular. We're seeing more long-term sicknesses, mental struggles, and issues with meds, so CAM could be a game-changer.

More People Accepting and Using It

- One big deal is that CAM is getting accepted and used more in regular healthcare all over the world. Governments, hospitals, and groups like the World Health Organization (WHO) see that old-school and other treatments can help everyone get healthcare.
- In India, they made a special department for Ayurveda, Yoga, and other natural treatments (AYUSH), which is a huge move to get CAM practices out there.
- China's got Traditional Chinese Medicine (TCM) in their health system. Western and Chinese medicine are taught and practiced together in schools and hospitals [66].
- In Europe and North America, you can find clinics that mix normal and other treatments like acupuncture, herbs, massage, and yoga, even in hospitals.
- Mixing proven CAM treatments with modern medicine shows things are changing. People are not just seen as sick bodies, but as whole people with feelings and spirits. This should keep growing as doctors and patients want care that's more complete and personal [67].

Science Backing It Up

To really get CAM accepted everywhere, we need solid science. People used to say CAM did not have enough proof it works and is safe. But, lately, there have been more research to back it up.

New tech in biology, medicine, and brain scanning helps us see how CAM treatments work. For example:

- Acupuncture can make you feel good by releasing endorphins and changing how you feel pain.

- Herbal medicine has stuff in it that works like regular drugs. Turmeric fights swelling, ginseng helps your body adapt, and ginkgo biloba helps your memory.
- Yoga and meditation can cut stress, help your immune system, and make you feel better overall. Brain scans show they change your brain activity.
- Groups like the National Center for Complementary and Integrative Health (NCCIH) in the U.S. and the Central Council for Research in Ayurvedic Sciences (CCRAS) in India help with research. We'll probably see more studies, gene research on CAM, and teamwork between healers and scientists [68].

Tech Helping Out

- Tech is changing how we get CAM treatments, learn about them, and use them. You can now talk to doctors online, use health apps, and get treatment plans made just for you.
- Online herb databases and AI can help make herb mixes standard and guess how they might work.
- You can wear devices that track how your body reacts during meditation, yoga, or acupuncture, so you can see how it's helping.
- They're making virtual reality (VR) and augmented reality (AR) tools to help you relax, meditate, and deal with pain.
- Mixing old healing knowledge with new tech should make CAM easier to get, safer, and more believable worldwide [69].

Better Training for Practitioners

- CAM's future also relies on better training for the people who practice it. Many countries are starting programs and licenses for CAM.
- Universities are offering degrees in acupuncture, naturopathy, and herbal medicine.
- Medical schools and CAM schools are working together, so people can learn from each other.
- Ongoing training, certifications, and guidelines will ensure folks get safe, good care from CAM practitioners.
- Better education will help normal and CAM professionals work together, respect each other, and use good science.

Big in Long-Term Health and Prevention

- Since more people have ongoing health problems like diabetes, high blood pressure, and depression, CAM's focus on preventing and dealing with these issues is getting noticed.
- Yoga, Tai Chi, Meditation, and Herbal Therapy help you stress less, control your body, and stay well.
- CAM treatments often look at how your mind and body are linked in long-term illnesses and how stress, food, and your surroundings play a role.
- Putting CAM in public health programs could save money and make people feel better.
- CAM could be key in stopping health problems and helping people stay healthy, especially as people get older and have less access to modern healthcare.

Working Together Worldwide

To make CAM stronger, countries need to work together. The WHO wants countries to see traditional medicine as part of healthcare. In the next 10 years, we should see:

- Rules for herbs to make sure they're good quality.
- Joint research between rich and poor countries to see how traditional treatments can help.
- Sharing ideas to protect old healing knowledge and update it.
- By working together, we can protect CAM systems, prove they work, and use them for years to come.

Problems to Solve

- CAM's future has some challenges.

- People are unsure because the research is not always great.
- Bad rules and unqualified people can cause issues or mix badly with regular meds.
- We need to think about who owns the rights to old knowledge.
- We need to ensure everyone can get CAM, it's affordable, and we respect their culture.
- We need to make clear rules for testing, certifying practitioners, and regulating products while respecting cultures.

The Big Picture: Personal Healthcare

- The best for CAM is to move toward healthcare that's personal. As healthcare gets more personal with genes and lifestyles, CAM's individual treatments fit right in.
- Custom herb and food plans based on your genes are becoming a thing.
- Mind-body things that fit your stress and feelings can help your mental health.
- Mixing surgery, drugs, herbs, and energy medicine could be normal in hospitals.
- This would give you more choices and make you happier, matching the goals of healthcare changes.

FINAL THOUGHTS

With its comprehensive, patient-centered approaches to wellness, complementary, and alternative medicine is essential to global healthcare. Although there are still issues with evidence and regulation, CAM's incorporation into traditional medicine offers a promising route to a more complete and inclusive healthcare system. The future extent and viability of CAM in contemporary medicine will be decided by ongoing investigation and scientific validation. Complementary and Alternative Medicine (CAM) is at an interesting point in healthcare right now. Even though we are making huge leaps in biotech, AI, and new medicines, there is a growing desire to get back to natural healing, cultural practices, and looking at health as a whole. CAM is all about that – seeing health as more than just not being sick; it's about being balanced in body, mind, and spirit.

What happens with CAM going forward depends on how well societies, researchers, doctors, and those who make the rules can connect old healing wisdom with what modern science tells us. It is equally important that this integration includes rigorous assessment of toxins, toxicants, and adverse effects, so that natural remedies are not assumed to be risk-free. Strengthening toxicological research, surveillance of adverse events and regulatory standards for CAM products will help to preserve their benefits while reducing toxin-related risks to public health [70].

CAM: Bridging the Old and the New

What makes CAM so valuable is how it mixes gut feelings with proof. Old systems like Ayurveda, Unani, and Traditional Chinese Medicine (TCM) came from centuries of watching and learning. They knew the body, mind, and environment were all linked – something modern medicine is just now figuring out with things like how the mind affects the immune system.

Unlike regular medicine, which often targets specific problems, CAM looks at the whole picture. It focuses on keeping things balanced, preventing issues, and helping the body heal itself. More and more, we are seeing these ideas accepted, which shows that old and new methods do not have to fight. They can work together. The trick is to turn this into real teamwork, where everyone respects each other and learns from science and each other [71].

CAM's Growing Popularity

Over the last few years, CAM has gone from being called old wives' tales to being seen as a real part of healthcare everywhere. The World Health Organization (WHO) says that around 80% of people in growing countries use some kind of traditional medicine as their main healthcare. This shows that CAM is easy to get, cheap, and fits in with their culture.

Even in richer countries, CAM is getting big. Places like the US, UK, Germany, and Australia have seen 40–60% of adults try something like acupuncture, homeopathy, yoga, or herbal stuff. Hospitals

and schools now have departments that mix regular and alternative treatments to help people feel better [72].

This change shows that people want more than just quick fixes. They want care that's personal, that stops problems before they start, and that lets them be involved, which is what CAM is good at. When governments, health groups, and schools start paying attention to CAM, it's a sign that healthcare is moving toward being more welcoming and giving people more control.

CAM: What Science Says

Medical research is starting to show why some CAM treatments work. Things once called unproven now have studies backing them up:

- Acupuncture can change how we feel pain, release feel-good chemicals, and control the nervous system.
- Yoga and meditation can lower stress, blood pressure, and make the immune system better.
- Herbs have been key to making modern drugs – aspirin came from willow bark, morphine from poppies, and an anti-malaria drug from Chinese herbs.

Also, CAM's focus on connecting mind and body lines up with what we're learning about the brain. Our feelings can affect our immune systems and hormone systems. This reminds us that health is about more than just the body; it's about feelings and our surroundings too. As we get better at research – with things like studying genes and cells – we'll understand CAM better and be able to use it with regular medicine [73].

What Needs to Be Fixed

Even though CAM is doing well, there are issues that need attention:

- *Things Are Not Standard:* Herbal products can be different in quality and strength. Without standards, it's hard to know if they're safe or if studies are accurate.
- *Not Enough Money for Research:* CAM research gets way less money than drug research. This makes it harder to prove what works and to do big studies.
- *Rules and Ethics:* Lots of countries do not have good rules for CAM doctors or products, which can lead to problems.
- *Not Enough Education:* Many doctors do not know much about CAM, and some CAM doctors do not know enough about science. This makes it hard to work together.
- *What People Think:* Some people think CAM can fix everything, while others think it's fake. We need to give people the right information, so they know the truth.

To fix these things, we need countries to work together, make good rules, and put money into research and training.

Making It Work Together

CAM's future is not separate; it's combined. Integrative medicine is when the best of modern science and old healing come together to give care that's personal and helpful.

- CAM can help stop diseases, handle long-term problems, and help people recover after regular treatment.
- Regular medicine can give us advanced tests, surgery, and emergency care when we need it.

Together, they offer a full range of care, targeting both problems and what causes them.

Countries like India and China are already showing how to use this mix. India has a ministry for traditional medicine, and China puts it in regular hospitals. In the West, schools like Harvard and Stanford have departments for integrative medicine, focusing on research and teamwork.

This suggests that we will not replace regular medicine with CAM. Instead, they'll work together, respecting different people, old wisdom, and proven science [74].

How Tech Helps

Technology will really shape CAM's next steps. Combining digital health, AI, and data is changing how we study, give, and personalize CAM treatments.

- AI can look at patient info to suggest the right herbs or diets.
- Online platforms let people talk to CAM doctors, especially in areas that do not have good access.
- Sensors can track how people respond to meditation, yoga, or acupuncture, so doctors can see progress.
- Digital records of plants and remedies can save old knowledge while helping us find new medicines.

By mixing old healing with new tech, CAM can become a system that uses data, is available everywhere, respects tradition, and uses new ideas.

What About Ethics, Environment, and Culture?

It's also important to keep CAM ethical and eco-friendly. As we use more herbs and natural products, we need to worry about taking too much, cutting down forests, and hurting wildlife. We need to get things from good sources, trade fairly, and protect plants for the future.

We also need to respect the knowledge of native people. Many CAM treatments come from their traditions, passed down through families. We need to protect this knowledge from being used unfairly.

Also, we should share CAM in a way that respects cultures. We should not take away the meaning or spirit just to fit Western ideas. Real teamwork means valuing culture while fitting into modern healthcare.

What's the Big Picture?

In the future, healthcare will likely be personal, preventive, participatory, and predictive – the 4 Ps of health science. CAM fits right in:

- It is personal, because treatments fit each person's needs.
- It's preventive, focusing on balance and lifestyle to avoid sickness.
- It lets people be involved, encouraging them to take charge of their health.
- And it can predict, using observation to spot problems before they get bad.

CAM will be key in dealing with mental health, lifestyle problems, and stress from the environment. Its ideas of balance and respect for nature are important in a world full of stress, pollution, and too much screen time.

Governments and health groups need to work together to build a system for CAM that's fair, based on proof, and includes different cultures. Educating people, having research groups around the world, and using new tech will make sure CAM is both believable and meaningful.

In Short: Old and New Working Together

To sum it up, Complementary, and Alternative Medicine is not just a fad. It's a return to looking at health in a complete way, something that people are starting to understand better. The point is not to get rid of regular medicine, but to balance old and new, science, and spirit, and people and nature.

By mixing science with old ways, CAM can help make healthcare more caring, fair, and complete. The key is teamwork – between doctors and scientists, leaders, and teachers, and cultures and generations.

As the line between alternative and regular medicine disappears, we get closer to a healthcare that sees the whole picture. True healing comes not just from medicine, but from balance, understanding, and respect for the world around us [75].

CONCLUSION

Complementary and Alternative Medicine (CAM) represents a long-standing and globally relevant approach to health that emphasizes holistic, patient-centered care and the use of natural therapies. As the use of CAM systems, such as Ayurveda, Unani, Traditional Chinese Medicine, and various herbal practices expands worldwide, questions of safety, toxins, and toxicological risk, have become increasingly important for clinicians, regulators, and public-health authorities.

Although many CAM modalities offer potential benefits for chronic disease management, stress reduction and prevention, they may also expose patients to intrinsic plant toxins, heavy metals, adulterants, and herb–drug interactions capable of causing organ toxicity and serious adverse effects when quality, dose, and duration are not adequately controlled. Strengthening toxicological research, pharmacovigilance systems, quality-control standards and regulatory oversight for CAM products is, therefore, essential to minimize toxin-related risks while preserving therapeutic advantages.

An integrated approach that combines traditional knowledge with modern toxicology, evidence-based assessment and transparent regulation can support safer use of CAM within contemporary healthcare systems. By systematically identifying, characterizing, and managing toxins and toxics associated with CAM, health professionals and policymakers can help ensure that integrative medicine contributes positively to human health without compromising safety.

REFERENCES

1. Charaka. Charaka Samhita. Sharma RK, Dash B, translators. Varanasi: Chowkhamba Sanskrit Series Office; 2001.
2. Sushruta. Sushruta Samhita. Sharma PV, translator. Varanasi: Chaukhambha Visvabharati; 2004.
3. Vagbhata. Ashtanga Hridayam. Murthy KRS, translator. Varanasi: Chowkhamba Krishnadas Academy; 2008.
4. Lad V. Ayurveda: The science of self-healing. Delhi: Motilal Banarsidass Publishers; 1998.
5. Frawley D. Ayurveda and the mind: The healing of consciousness. Twin Lakes (WI): Lotus Press; 1997.
6. World Health Organization. WHO traditional medicine strategy 2014–2023. Geneva: WHO Press; 2013.
7. Bensky D, Barolet S. Chinese herbal medicine: Materia medica. Seattle: Eastland Press; 1990.
8. Deadman P, Al-Khafaji M, Baker K. A manual of acupuncture. 2nd ed. Hove (UK): Journal of Chinese Medicine Publications; 2007.
9. Kaptchuk TJ. The web that has no weaver: Understanding Chinese medicine. New York: McGraw-Hill; 2000.
10. Unschuld PU. Huang Di Nei Jing Su Wen: Nature, knowledge, imagery in an ancient Chinese medical text. Berkeley: University of California Press; 2003.
11. Hahnemann S. Organon of the healing art. 6th ed. New Delhi: B. Jain Publishers; 1996.
12. Kent JT. Lectures on homeopathic materia medica. New Delhi: B. Jain Publishers; 2003.
13. Boericke W. Pocket manual of homeopathic materia medica and repertory. 9th ed. New Delhi: B. Jain Publishers; 2007.
14. Pizzorno JE, Murray MT. Textbook of natural medicine. 4th ed. St. Louis: Elsevier Churchill Livingstone; 2013.
15. Hammerschlag R, Muse N, editors. Complementary and alternative medicine: Ethics, the patient, and the physician. Totowa (NJ): Humana Press; 2004.
16. Rakel D, editor. Integrative medicine. 4th ed. Philadelphia: Elsevier; 2018.
17. Rakel D, Talbott E, editors. Principles and practice of integrative medicine. New York: McGraw-Hill Education; 2017.
18. Ernst E. Complementary medicine: A critical assessment of the evidence. London: Butterworth-Heinemann; 1996.
19. Ernst E, Pittler MH. The desktop guide to complementary and alternative medicine: An evidence-based approach. Edinburgh: Mosby; 2001.

20. National Center for Complementary and Integrative Health (NCCIH). Complementary, alternative, or integrative health: What's in a name? Bethesda (MD): NIH; 2020.
21. Bone K, Mills S. Principles and practice of phytotherapy: Modern herbal medicine. 2nd ed. Edinburgh: Churchill Livingstone; 2013.
22. Hoffmann D. Medical herbalism: The science and practice of herbal medicine. Rochester (VT): Healing Arts Press; 2003.
23. Blumenthal M, editor. The ABC clinical guide to herbs. Austin (TX): American Botanical Council; 2003.
24. Benzie IFF, Wachtel-Galor S, editors. Herbal medicine: Biomolecular and clinical aspects. 2nd ed. Boca Raton (FL): CRC Press; 2011.
25. Newall CA, Anderson LA, Phillipson JD. Herbal medicines: A guide for health-care professionals. London: Pharmaceutical Press; 1996.
26. Tyler VE. Pharmacognosy. 9th ed. Philadelphia: Lea & Febiger; 1988.
27. McGuffin M, Hobbs C, Upton R, Goldberg A, editors. American herbal pharmacopoeia: Botanical pharmacognosy. Boca Raton (FL): CRC Press; 2011.
28. Kessler RC, Littlejohns P, editors. Complementary and alternative therapies in nursing and midwifery. Oxford: Oxford University Press; 2000.
29. Kabat-Zinn J. Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness. New York: Bantam Dell; 2013.
30. Kabat-Zinn J. Wherever you go, there you are: Mindfulness meditation in everyday life. New York: Hyperion; 1994.
31. Iyengar BKS. Light on yoga. Rev ed. New York: Schocken Books; 1995.
32. Desikachar TKV. The heart of yoga: Developing a personal practice. Rochester (VT): Inner Traditions; 1999.
33. Benson H. The relaxation response. New York: HarperCollins; 1975.
34. Pert C. Molecules of emotion: Why you feel the way you feel. New York: Scribner; 1997.
35. Benson H, Klipper MZ. The relaxation revolution. New York: Scribner; 2010.
36. Krieger D. The therapeutic touch: How to use your hands to help or heal. Englewood Cliffs (NJ): Prentice Hall; 1979.
37. Dossey L. Healing beyond the body: Medicine and the infinite reach of the mind. Boston: Shambhala Publications; 2001.
38. Oschman JL. Energy medicine: The scientific basis. 2nd ed. Edinburgh: Churchill Livingstone; 2015.
39. Stone IR. Complementary and alternative medicine for older adults. New York: Springer Publishing Company; 2008.
40. Jonas WB, Levin JS. Essentials of complementary and alternative medicine. Philadelphia: Lippincott Williams & Wilkins; 1999.
41. Astin JA. Why patients use alternative medicine: Results of a national study. JAMA. 1998;279(19):1548–53.
42. Berman BM, Lao L, editors. Research methodology in complementary and alternative medicine. London: Elsevier Academic Press; 2002.
43. Vickers A, Zollman C. ABC of complementary medicine. London: BMJ Books; 1999.
44. Barrett S. The consumer's guide to alternative medicine. Amherst (NY): Prometheus Books; 2001.
45. Sierpina VS, Vickers A, editors. Integrative medicine: Principles for practice. New York: McGraw-Hill Medical; 2012.
46. Fisher P, Ward A. Complementary medicine in Europe. BMJ. 1994;309(6947):107–11.
47. World Health Organization. WHO monographs on selected medicinal plants. Vols 1–4. Geneva: World Health Organization; 1999–2009.
48. Tilburt JC, Kaptchuk TJ. Ethical issues in complementary and alternative medicine. JAMA. 2008;299(6):635–7.
49. Saper RB, Eisenberg DM. Safety and herb–drug interactions in complementary and alternative medicine. Med Clin North Am. 2002;86(1):23–42.

50. Bodeker G, Kronenberg F. A public health agenda for traditional, complementary and alternative medicine. *Am J Public Health*. 2002;92(10):1582–91.
51. McIntyre CL. Herbal remedies and dietary supplements: Scientific evaluation and clinical implications. New York: Springer Publishing Company; 2010.
52. Swayne L. Nutrition and complementary therapies: Evidence and practice. Oxford: Butterworth-Heinemann; 2005.
53. Meulenbeld GJ. A history of Indian medical literature. Vols 1–5. Groningen: Egbert Forsten; 1999–2002.
54. Avicenna (Ibn Sina). The canon of medicine. Gruner OC, translator. London: Luzac & Company; 1930.
55. Gaw A. A cultural history of medicine: Traditional therapies in context. London: Routledge; 2005.
56. McIntyre TM, Zimmerman CE. Homeopathy: An evidence-based perspective. New York: Springer; 2008.
57. Hardin D, McKernan SP. Clinical applications of herbal medicine. St. Louis: Mosby Elsevier; 2011.
58. Senn N, editor. Herbal formulations and standardization: Regulatory perspectives. Boca Raton (FL): CRC Press; 2014.
59. Saper RB, Phillips RS. Integrative oncology: Supportive care and complementary therapies. *Cancer J*. 2009;15(5):425–31.
60. Cassileth BR, Deng G. Integrative oncology: Complementary therapies for cancer patients. London: Oxford University Press; 2014.
61. Boddy K. Chiropractic: Principles and practice. Edinburgh: Churchill Livingstone; 2011.
62. Gatterman MI. Foundations of chiropractic: Subluxation and clinical practice. St. Louis: Mosby; 2005.
63. McGregor M, Byrne G. Manual therapy and massage in complementary medicine practice. London: Elsevier Health Sciences; 2008.
64. Kaptchuk TJ, Eisenberg DM. Placebo effects in alternative medicine: Scientific and ethical considerations. *Ann Intern Med*. 2001;135(11):865–75.
65. Astin JA, Rausch LR. Mind–body medicine and behavioral therapies in integrative practice. *Prim Care*. 2002;29(2):293–310.
66. Shankar R, George M. Public health and traditional medicine: Policies and practices. New Delhi: Oxford University Press; 2013.
67. Kessler RC, van den Berg B. Complementary and alternative medicine: Policy and practice. New York: Palgrave Macmillan; 2008.
68. Müller J, Seitz HJ. Phytotherapy in clinical practice: Evidence and application. Berlin: Springer-Verlag; 2010.
69. Ernst E, Schmidt K, editors. The desktop guide to complementary and alternative medicine: An evidence-based approach. Edinburgh: Mosby Elsevier; 2004.
70. Thornton R, Theoharides TC. Herbal pharmacology and clinical therapeutics. New York: CRC Press; 2012.
71. Barrett S, Jarvis WT. The health fraud handbook. Buffalo (NY): Prometheus Books; 1993.
72. Sibbritt D, Adams J. The use and regulation of complementary therapies in Australia and New Zealand. *J Altern Complement Med*. 2008;14(4):347–55.
73. Wilkinson J, Wadsworth M. Complementary therapies in medicine: An evidence-based guide for nurses and allied health professionals. London: Routledge; 2002.
74. Linde K, Meissner K. Methodological issues in clinical trials of complementary therapies. *Complement Ther Med*. 2011;19(4):191–7.
75. Broom A, Adams J. Sociology of complementary and alternative medicine: Culture, belief and practice. London: Routledge; 2012.