RESEARCH PAPER

Integrative Medicine: Bridging Conventional and Traditional Approaches for Holistic Patient-Centered Care

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Received: 14th June, 2026; Revised: 20th July 2026; Accepted: 20th August, 2026; Available Online: 05th September 2026

ABSTRACT

Integrative medicine is a comprehensive approach to health care that integrates conventional medicine along with complementary or alternative therapies to treat physical, mental, social, emotional, and spiritual health. Conventional medicine, also known as Western or allopathic medicine, uses drugs, surgery, or radiation to treat illnesses, mainly focusing on pathology, not on holistic health. Traditional medicine, such as Unani, focuses on individualized treatment, balancing the four humors or body fluids such as blood, phlegm, yellow bile, and black bile, along with a person's lifestyle, diet, and natural products to maintain health. There is a need to integrate conventional medicine with evidence-based complementary or alternative therapies such as traditional Chinese medicine, homeopathy, massage, and nutritional therapy to improve treatment outcomes, side effects, and patient-centered health care, which is a shift towards holistic health.

Keywords: Traditional medicine, Integrative medicine, medicine, human and disease, Holistic healthcare

How to cite this article: Akram M, Ahsan M, Munir N, Soonmin H., Integrative Medicine: Bridging Conventional and Traditional Approaches for Holistic Patient-Centered Care. Int J Drug Deliv Technol. 2026; 16(8): 255-261. DOI: 10.25258/ijddt.16.8.26
Source of support: Nil.
Conflict of interest: None

INTRODUCTION

In contemporary clinical practice, many doctors prefer a combined approach, using both herbal and conventional or Western medicines in the treatment of various chronic diseases, such as arthritis, cancer, and liver cirrhosis. Herbal medicines are often used as adjuvant therapies because of their "natural" origin and their traditional use. It is, however, imperative to stress the point that, like other synthetic drugs, herbal medicines also need to be produced, standardized, and administered according to specific and stringent guidelines to ensure their efficacy, quality, and safety. Without proper standardization, the efficacy of herbal drugs can vary, which can result in a variety of health problems. It is also a general perception among the public that herbal medicines are free from side effects. However, the fact of the matter is that herbal medicines contain powerful bioactive molecules, which can produce significant side effects if abused. In case of asthma, ephedrine medicine ephedrine, which contains the bioactive molecule ephedrine, can produce severe cardiovascular complications, such as high blood pressure and arrhythmias, if not used properly. This is because the philosophy of Integrative Medicine (IM) is a holistic approach that combines traditional and modern medical therapies. IM is a medical approach that treats the patient as a whole and not just the disease or its symptoms. Although this approach has shown promising benefits in the management of chronic diseases, there is a lack of standard systems of evaluating and coordinating the efforts of traditional and conventional medical practitioners. This is a clear indication of the need for inter-professional collaboration and research in the field of Integrative Medicine to improve the safety of the patient and the outcomes of the treatment process[1].

Unani medicine is a traditional medical approach that was first practiced in ancient Persia over two thousand years ago. It is a medical approach that is based on the concept of humoral balance in the body. According to this concept, the body is composed of four humors or liquids: blood, phlegm, yellow bile, and black bile. Health is a balance of these four humors in the body. Diseases occur when there is a disturbance in the balance of these humors in the body. Unani medicine is a traditional medical approach that Despite the advances made in the traditional and integrative approaches, the process of drug development in the modern world is still a complex, time-consuming, and expensive procedure. It takes an average of 10-12 years for a newly developed drug to reach the market from the time it is first researched. This involves a number of

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stages, including the discovery, preclinical, and clinical tests, and finally, approval and release into the market. Moreover, only a small number of the tested drugs, in some cases only one out of thousands, make it to the market because of the problems encountered in the process, including efficacy, safety, and regulatory issues. This, therefore, underscores the need for scientific scrutiny and the cost involved in the process of drug innovation[2].

Medicinal drugs in use in the contemporary world have been obtained from a wide range of sources[3], which can be divided into the major categories of plant-based, animal-based, mineral-based, microbial, and synthetic sources. These sources have made a unique contribution to the field of pharmacotherapy, and the use of these sources has been the foundation upon which the field has grown.

SOURCES OF DRUGS

Animal Sources

Drugs derived from animal tissues, glands, and secretions have been of primary importance in therapeutics, especially before the discovery of modern synthetic and recombinant technology. The drugs derived from animal tissues, glands, and secretions are biologically active substances similar to physiological substances found in humans. Hence, they are effective drugs. For example, insulin, derived from animal pancreas, is used for treating diabetes mellitus. Heparin, derived from porcine intestinal mucosa, is used as an anticoagulant for treating thromboembolic diseases.

Digestive enzymes, including pepsin, trypsin, and chymotrypsin, are used for enzymatic therapy[4]. Adrenaline, derived from animal adrenal medullary glands, is used in emergency medical procedures. Oxytocin and vasopressin, derived from animal pituitary glands, are used for treating various medical conditions. Calcitonin, derived from salmon, is used for treating osteoporosis. Other animal-derived drugs include antisera and vaccines, used for passive and active immunity. These are important drugs in pharmacology and therapeutics.

Plant Sources

Drugs derived from animal tissues, glands, and secretions have traditionally played a vital role in therapeutics, particularly before the development of sophisticated synthetic and recombinant technology[5]. These drugs are often biological active substances that resemble physiological substances in humans, thus being highly potent replacement therapies or disease management tools. For example, insulin, which was first derived from bovine and porcine pancreas, has been a major drug in the treatment of diabetes mellitus, although this is now largely replaced by recombinant technology. Heparin, which is derived from porcine intestinal mucosa, is widely used as an anticoagulant in the prevention and treatment of thromboembolic disorders. Other drugs derived from animal tissues, glands, and secretions include preparations of thyroxin, which is derived from the thyroid gland, and growth hormone, which is derived from the pituitary gland, used to treat deficiencies of these hormones.

Plants are one of the oldest sources of medicinal substances, which have formed the basis of both traditional and contemporary medicine. For ages, plants have formed a vital part of the health and wellness of humans, being used to prevent or treat various forms of disease. Plants have provided a rich source of medicinal compounds, which have been used to treat a variety of diseases since few hundred years ago.

Medicines derived from animal tissues, glands, and secretions have traditionally been of great importance in therapy, especially before the advent of advanced synthetic and recombinant techniques. These medicines contain biologically active substances that are similar to human body fluids and, therefore, are extremely potent in replacement therapy and management of diseases. For example, insulin, which was previously derived from bovine and porcine pancreas, has been of great importance in the management of diabetes mellitus, although it has been largely replaced by recombinant DNA techniques. Heparin, which is derived from porcine intestinal mucosa, is widely used as an anticoagulant in the management of thromboembolic diseases. Hormones, such as thyroxine derived from the thyroid gland and growth hormone derived from the pituitary gland, have been used in the management of endocrine deficiency states[6]. Several known drugs, which are now part of contemporary medicine, are plant-based and have significantly contributed to the advancement of pharmacotherapy.

Insulin, which was initially obtained from the pancreas of bovine and porcine sources, has played a vital role in the management of diabetes mellitus, though nowadays it is obtained through recombinant technology[7]. Another example of an important drug obtained from animal sources is heparin, which is obtained from the intestinal mucosa of pigs. It finds a wide range of application in the prevention and management of thromboembolic disorders. There are several important drugs used in modern medicine that are obtained from plants, which have played a pivotal role in the advancement of modern pharmacotherapy. For example, morphine, an opioid analgesic obtained from the opium poppy plant (Papaver somniferum), finds a wide range of application in the management of pain. Another important drug obtained from plants is digitalis, which is obtained from the foxglove plant (Digitalis purpurea). It finds a wide range of application in the management of heart failure and arrhythmias, as it has positive inotropic.

Inorganic (Mineral) Sources

Mineral-based medications are an important part of the use of drugs in medical practice, both as supplements and specific therapeutic agents[8]. Mineral-based medications are derived from naturally occurring inorganic elements and are primarily used to replace deficiencies, manage metabolic problems, or treat diseases that have been diagnosed in the body. Lithium carbonate is an excellent example of a mineral-based medication that is an essential part of the treatment of people with a bipolar disorder using psychiatric medications. Magnesium sulfate is

another example of a commonly used mineral-based medication; it has multiple medical uses including use as a laxative, anticonvulsant, and as treatment for an unstable form of hypertension defined as eclampsia. Sodium bicarbonate is used as an antacid and systemic alkalinizing agent in the treatment of various diseases and disorders; calcium gluconate is used in the treatment of people with low levels of calcium and those with certain diseases or complications from their medications. Ferrous sulfate is an example of a mineral-based medication that is frequently used to treat iron-deficiency anemia; zinc oxide is a mineral-based medication used for dermatological purposes including to assist in the healing of wounds and providing sun protection.

Medical practitioners use a variety of minerals to create drugs that provide specific medical benefits beyond the nutritional roles of these minerals. For example, aluminum hydroxide, which is an antacid and phosphate binder, is helpful in managing renal disease. Gold salts have an immunomodulatory effect and are often used to treat rheumatoid arthritis. Arsenic trioxide is a mineral-derived anticancer drug, particularly effective for treating acute promyelocytic leukemia. In general, the list of important minerals, such as iodine and sulfur, includes many that have historically been used to improve certain areas of health (such as supporting a healthy thyroid or for dermatological health). Overall, minerals continue to be a critical aspect of the pharmacology and clinical efficacy of various types of drugs[9].

Synthetic Sources

Synthetic drugs are man-made drugs, meaning they are created in a laboratory, and they are a major part of today's pharmacotherapy, mainly because synthetic drugs can provide a specific dose and effect in bulk quantities. The main reason synthetic drugs are effective is that they are designed to work on a specific part of a person's body. This is different from plant or mineral drugs. Painkillers or Analgesics, paracetamol[10], aspirin, ibuprofen, diclofenac, etc., are synthetic drugs used to treat pain, inflammation, or reduce fever in a person. Propranolol and atenolol are synthetic drugs used to treat cardiovascular diseases, among other health issues. Both synthetic drugs are used to treat high blood pressure, abnormal heart rhythms, and heart problems.

Synthetic drugs play a significant role in treating various health issues, including gastrointestinal diseases, neurologic diseases, endocrine diseases, infectious diseases, aside from cardiovascular diseases. For example, omeprazole, a proton pump inhibitor, is used to treat peptic ulcers or gastroesophageal reflux disease by inhibiting the production of stomach acid. Diazepam, an anxiolytic or anticonvulsant, is used to treat anxiety or prevent seizures. Metformin is used to treat type 2 diabetes. Ciprofloxacin, an antibiotic, is used to treat various bacterial infections.

Chemical compounds that are synthesized by means of the chemical transformation of natural materials and substances are called semi-synthetic drugs. This is achieved by means of either a modification of the chemical nature of the compound or by chemically synthesizing a new compound based on a compound that is derived from a naturally occurring material. In either case, the aim and objective of the manufacturer is to produce a chemical compound that has enhanced qualities and characteristics, which can be used as a therapeutic and chemical agent. The main advantage of manufacturing antibiotics and other pharmacological agents is that there is a good possibility of producing drugs that have desirable characteristics and/or properties, including increased potency, pharmacokinetic profile, and reduced chances of the development of bacterial resistance, compared to the production and formulation of such agents by means of other methods and processes. There are two types of antibiotics, namely, the beta-lactam antibiotics[11] and the cephalosporin antibiotics, which are semi-synthetic in nature. Amoxicillin and ampicillin are semi-synthetic antibiotics, as these have been chemically altered and enhanced to produce effective oral absorption.

Biological (Microbial) Sources

Microorganisms are a major source of therapeutically important drugs, particularly antibiotics and other bioactive compounds that have revolutionized modern medicine. These compounds are produced as secondary metabolites by bacteria, fungi, and actinomycetes, often serving as defense mechanisms against competing microorganisms. The antibiotic era began after researchers discovered penicillin from the Penicillium notatum fungus. The first successful tuberculosis treatment was developed through the extraction of streptomycin from Streptomyces griseus. The main antibiotics which bacteria produce include tetracycline and erythromycin and chloramphenicol and vancomycin which all treat various bacterial infections. The drugs operate through different methods because they either stop protein production or block the development of cell walls[12]. Microorganisms produce non-antibiotic bioactive compounds which have important medical uses for clinical applications in addition to their production of antibiotics. Doctors use the fungal metabolite cyclosporine as an immunosuppressant to prevent organ transplant rejection. Lovastatin which comes from fungi works as a cholesterol-lowering medication because it inhibits HMG-CoA reductase to decrease cardiovascular disease risks.

Biotechnological Sources

The field of modern biotechnology has achieved groundbreaking progress in drug research and development through its implementation of recombinant DNA technology which produces therapeutic agents with exceptional precision and safety. The process of recombinant DNA technology enables scientists to insert genes that code for specific proteins into various host organisms including bacteria and yeast and mammalian cells which then produce the target proteins in large amounts[13]. The approach delivers advantages because it solves various problems which normally affect traditional

drug production methods through its ability to deliver stable and consistent drug effects which maintain safe treatment standards. The field of biotechnology achieved one of its major breakthroughs through the creation of recombinant human insulin which serves as a better alternative to animal-based insulin for diabetes treatment because it contains higher purity levels and lower immunogenic properties. Interferons function as natural antiviral proteins which modulate the immune system. Scientists now produce these proteins through recombinant techniques. Patients use them to treat viral infections and specific cancer types.

The field of modern biotechnology has introduced novel methods for creating and testing new medicines through its use of recombinant DNA technology which produces better targeted and safer medical treatments[14]. The process of recombinant DNA technology enables scientists to insert genes from various organisms into bacteria yeast and mammalian cells which then produce desired proteins at scale. The scientists developed this method to produce drugs which solve contamination issues while delivering continuous drug effects to patients through medicinal products which conventional manufacturing systems used to create.

Modern biotechnology has created a complete transformation in the process of discovering and creating drugs through recombinant DNA technology, which produces therapeutic drugs that show particular effectiveness and improved safety. The process of recombinant DNA technology enables scientists to transfer genes that code for specific proteins into host cells, which include bacteria and yeast and mammalian cells, to generate large quantities of those proteins. This method provides a solution to multiple challenges that emerge from using conventional drugs because drugs face issues with unpredictable effects and their availability problems and contamination hazards. The most important discovery in biotechnology has produced recombinant human insulin, which now serves as the main treatment for diabetes mellitus because it offers better purity and lower immunogenicity compared to animal-based insulin. Scientists now produce interferons, which function as natural antiviral and immunomodulatory proteins, through recombinant techniques to create a treatment option for both viral infections and certain cancers[15].

The field of modern biotechnology established a new path for drug discovery and production because scientists developed specific safe medications through their use of recombinant DNA technology. Scientists use recombinant DNA technology to transfer genes that code for specific proteins into host organisms including bacteria and yeast and mammalian cells which produce those proteins in large amounts. The approach eliminates the problems which traditional drug sources face because of their unpredictable nature and their limited availability and their potential to become contaminated.

Marine Sources

Marine organisms develop their extreme ocean survival abilities through their unique metabolic systems which produce bioactive substances. Medical research shows that these compounds can treat three different medical conditions which include cancer and pain management and heart disease. The first successful leukemia treatment and blood cancer therapy derived from marine sponges[16] which scientists isolated cytarabine from the sea creature. Doctors use trabectedin as a treatment because scientists developed it from the sea squirt Ecteinascidia turbinata to fight two types of cancer which include soft tissue sarcomas and ovarian cancer. Marine biodiversity provides essential research material that drug discovery processes need.

Researchers discovered that marine organisms produce medicinal compounds which scientists used to develop treatments for neurological and metabolic disorders. Ziconotide serves as a pain relief drug which treats extreme chronic pain through its active ingredient a synthetic peptide developed from cone snail venom research. Marine-derived compounds function in the health sector because they serve both nutritional purposes and preventive medicine applications. People obtain omega-3 fatty acids from marine fish oils which help reduce cardiovascular disease risks through their ability to lower triglyceride levelsand deliver anti-inflammatory effects. Researchers continue to study marine peptides and secondary metabolites for scientific applications.

The current research findings show that all pharmaceutical substances develop through two main methods which scientists use to discover new drugs and to produce existing drugs through contemporary drug manufacturing techniques. Plants and animals and microorganisms serve as three natural medical sources which continue to support modern medicine even though scientists utilize synthetic chemistry and biotechnology for their drug development work. Scientists use combinatorial chemistry and recombinant DNA technology and computer-aided drug design to develop new compounds which provide improved therapeutic benefits compared to existing natural products. The research method uses natural product diversity together with modern scientific methods to create new medicines which provide better safety and effectiveness for different medical conditions.

HISTORICAL APPROACH TO DRUG DISCOVERY

The historical approach to drug discovery shows that modern pharmaceuticals trace their origins to traditional remedies which were derived from natural sources. The first civilizations developed their medical treatments through their practical knowledge of using plant and mineral and animal resources. The scientific developments of history enabled scientists to isolate and identify and manufacture active compounds which exist in natural substances. South American indigenous people used Cinchona bark for centuries until scientists discovered that quinine functions as an effective antimalarial drug. Scientists developed aspirin from salicin which they

extracted from willow bark because people traditionally used the bark for pain relief and fever reduction. Traditional knowledge has established the basis for modern pharmacology which links empirical healing methods with scientific medical practices according to these examples.

TRADITIONAL MEDICINE AND PLANT EFFICACY

Traditional medicine systems from South Asia focus their research on natural substances from their traditional medical practices. Unani medicine develops its medical treatments through the combination of plant materials with mineral substances and metal components and animal-derived products. The concept of synergism, which describes how multiple elements in a traditional medicine formulation work together to produce better treatment outcomes with reduced side effects, serves as one of its defining characteristics. Traditional systems use whole plant preparations because their practitioners believe that these natural substances produce superior therapeutic results compared to conventional medicine which uses individual synthetic chemical compounds. The scientific assessment of traditional remedies requires complete examination which involves standardized testing methods and quality control procedures and active ingredient identification. The product produces unpredictable treatment results because its validation process remains non-existent and its composition and strength change unpredictably[17].

UNANI MEDICINE

The Unani medical system functions as a complete medical system which provides three main therapeutic approaches. The medical practice of Unani medicine follows the ancient medical systems of Greek and Arab traditions which require physicians to maintain their patients' internal body equilibrium[18]. The healthcare team needs to obtain full patient information through three different assessment techniques which include medical history review and pulse examination and physical evaluation. The assessment results will identify which treatment techniques should be applied to achieve patient balance restoration. Unani medicine offers various dosage forms which include powders and syrups and electuaries and suspensions and distilled herbal waters. The different demographic groups display their interest in the formulations because they provide budget-friendly and easy-to-get products. The common belief about Unani medicines that they have no side effects at all is incorrect because this belief needs scientific evidence through research and clinical testing to be validated.

INTEGRATION OF TRADITIONAL MEDICINE

The system which enables national healthcare systems to adopt traditional medicine faces multiple challenges and benefits. Traditional medicine provides healthcare solutions which people from different cultures accept and which they can afford in areas with few resources. The system faces major challenges because current issues require multiple components to develop solutions which address both regulatory needs and practitioner development and safety requirements and accountability systems. The establishment of quality standards together with safety measures for traditional therapies needs standard guidelines about their proper implementation through dedicated practitioner training programs. Ethical considerations also function as critical factors which protect patient rights while enabling doctors to obtain informed consent. The requirements for traditional treatments to achieve successful integration need to pass through comprehensive scientific testing which follows established evidence-based procedures. The process requires clinical trials together with pharmacological and toxicological studies to establish treatment efficacy and safety[19].

INTEGRATION OF TRADITIONAL CHINESE MEDICINE AND WESTERN MEDICINE

Traditional Chinese Medicine (TCM) stands as one of the earliest and most complete medical systems that exist throughout the world. The medical system establishes its fundamental principles through its complete understanding of yin and yang balance together with vital energy (qi) flow and organ system relationships. Healthcare professionals use TCM in combination with Western medicine because this approach leads to better results for their patients. The two healthcare systems merge their distinct advantages through TCM's complete body assessment and Western medicine's evidence-based scientific approach. The two systems work together to create new treatment methods which particularly benefit patients who experience persistent and complex medical issues. The successful integration process requires research across different disciplines to establish standard methods which both systems practitioners must understand. The combination of therapies needs evidence-based validation to prove their safety and effectiveness and scientific backing[20].

CONTRIBUTION OF MUSLIM SCIENTISTS IN OPHTHALMOLOGY

Muslims reached their peak accomplishments during the Islamic Golden Age which established their first medical specialty in ophthalmology[21]. I Ibn Sina (Avicenna) created his primary medical textbook which included complete eye disease descriptions together with their treatment methods that provided new medical insights for his era. The researcher created a system which identified different eye diseases together with their respective medications needed for each specific eye condition. Ibn al-Haytham who established optics as a science, discovered fundamental aspects of human vision which included both light properties and human light perception. His research established modern ophthalmology foundational principles which explain human vision through the eye process of light detection. The scholars established new concepts which maintained existing knowledge because their work continues to shape current medical research. Historical text analysis shows its value to develop current healthcare systems.

Discussion: Update on Traditional, Western, and Integrative Medicine in Light of Current and Previous Studies

Significant changes have been observed in the global health care scenario, as traditional, Western, and integrative medicines are recognized as complementary rather than competitive systems of health care delivery. The traditional medicine system has traditionally been the mainstay of health care delivery systems in most of the populations of the world, especially in Asia and Africa, where traditional medicine systems such as Unani, Ayurveda, and Traditional Chinese Medicine[22] have been in practice for centuries. These traditional medicine systems of health care delivery have traditionally adopted a holistic approach and believe in the concept of maintaining balance in the body and its functioning. It has been revealed in the studies conducted in the past that 70-80% of the populations of developing countries depend on traditional medicine as a means of meeting their primary health care needs, which indicates the acceptability of traditional medicine as a means of health care delivery in the populations of these countries.

Western medicine is another term for allopathic or conventional medicine. Western or allopathic medicine has undergone a rapid evolution in the last century, especially in response to the advancements in the field of medical research, pharmacology, and technology. Western. However, there are also challenges that are associated with the integration of modern medicine and traditional medicine. Some of the challenges that are associated with integrative medicine are safety, efficacy, and regulation[23]. For example, there is a need to standardize herbal medicine. Some herbal medicine products have been found to contain varying amounts of active ingredients, which are also toxic in nature. For example, herb-drug interactions have been noted in integrative medicine. Some herbal medicine products have been noted to enhance or decrease drug effects. For example, ginseng and ephedrine have been noted to have adverse effects on the heart and brain, respectively, when used inappropriately. Therefore, quality control, pharmacovigilance, and clinical guidelines are needed in integrative medicine to enhance safety.

Another aspect of integrative medicine is scientific validation. For example, although a lot of traditional medicine products have been noted to have a lot of therapeutic potential, scientific validation is needed. Some of the products have been noted to have a lot of therapeutic potential. Furthermore, the combination of knowledge of traditional medicine practitioners and Western medicine experts is essential for the success of integrative healthcare services. Educational programs, policy guidelines, and regulatory bodies must be developed for the success of healthcare professionals and patients. China and India have achieved excellent outcomes through their implementation of traditional medicine into their medical systems. The countries serve as examples which other nations throughout the world can follow. The World Health Organization 2019 report states that despite achieving success traditional medicine and conventional medicine principles and their treatment methods and evidence-based medicine practice continue to face challenges in uniting their respective systems.

CONCLUSION

The integration of traditional, Western, and modern medical systems is a step forward in a holistic and patient-centric approach to healthcare services. Even though conventional medicine has provided advanced medical technologies, traditional medicine has provided valuable insights into preventive healthcare and holistic healing methods. The combination of conventional and alternative medicine has filled the gap, thereby enhancing the efficacy of healthcare services and patient satisfaction. However, for the success of the combination of traditional and modern medicine, scientific validation, standardization, and the development of innovative healthcare modalities must be explored for meeting the demands of the modern world. Herbal medicine is an integral part of health care, which has a long history of being acknowledged as a nutritional and therapeutic agent. Herbal medicine is a major influence in the development of drugs, and most of the drugs in use today contain plant compounds. However, the safe integration of herbal medicine into health care delivery is dependent on the scientific validation, standardization, and safety of the herbal medicine in use. There is evidence that the integration of herbal medicine and conventional medicine in health care is beneficial in improving the outcome of treatment, minimizing the side effects of drugs, and improving the quality of patient care. The future of health care is dependent on the integration of both traditional and conventional medicine in a safe way.

Ethics Statement

Since this study is a review article, ethical committee approval was not necessary.

Disclosure Statement

The author declares no financial or proprietary interests related to this manuscript.

Conflicts of Interest

The author(s) declare(s) that there is no conflict of interest regarding the publication of this paper.

Funding Statement

Author (Ho SM) was financially supported by INTI International University, Malaysia.

Acknowledgments

Author (Ho SM) was financially supported by INTI International University, Malaysia.

REFERENCES

1. Katzung B. Basic & Clinical Pharmacology. McGraw-Hill Education, 2021.
2. Rang H, Dale M, Ritter J, Flower R. Rang & Dale's Pharmacology. Elsevier, 2016.

3. Wong L, Babu M, Kumar M, Kaur I, Kumar S. The role of GATA4 in mesenchymal stem cell senescence: A new frontier in regenerative medicine. Regenerative Therapy, 2025; 28: 214-226.
4. Adamson C, Kanai M. Integrating abiotic chemical catalysis and enzymatic catalysis in living cells. Organic & Biomolecular Chemistry, 2021; 19: 37–45.
5. Sonia M, Ana P, Maria P. Bioactive Compounds Derived from Plants and Their Medicinal Potential. Pharmaceuticals, 2025; 18: https://doi.org/10.3390/ph18111732.
6. Douti F, Katawa G, Arndts K, Bara F, Awesso E. Potential of *Aframomum melegueta* and *Xylopia aethiopica* Against *Taenia* spp.: Plant-Based Remedies as Novel Anthelmintics. Pharmaceuticals, 2025: 18: 749.
7. Lee B, Park S, Seung K, Jin H, Choi K. Insulin Therapy for Adult Patients with Type 2 Diabetes Mellitus: A Position Statement of the Korean Diabetes Association, Diabetes & Metabolism Journal, 2017; 41: 367-373.
8. Oliver W, Xu Y, Peter J. Minerals in biology and medicine. RSC Advances, 2021; 11: 1939–1951.
9. Brunton L, Hilal, R, Knollmann B. Goodman & Gilman's The Pharmacological Basis of Therapeutics *(13th ed).* McGraw-Hill, 2018.
10. Milani G, Nicolini G, Mara C, Luca S. Efficacy and Safety of Paracetamol and NSAIDs for Fever and Pain Management in Children with Chronic Diseases: A Narrative Review. Children, 2026; 13: https://doi.org/10.3390/children13010071.
11. Maria S, Matthew E, Iva D, Vrysis C. New β-Lactam/β-Lactamase Inhibitor Combination Antibiotics. Pathogens, 2025; 14: https://doi.org/10.3390/pathogens14040307
12. Pelczar M, Chan E, Krieg N. Microbiology. McGraw-Hill, 2010.
13. Khaled D, Hind A, Fatma A, Kamal S. Industry 5.0 Digital DNA: A Genetic Code of Human-Centric Smart Manufacturing. Sustainability, 2025; 17: https://doi.org/10.3390/su17219450.
14. David R. Recombinant DNA in Medicine and Agriculture: Innovations and Applications. Journal of Molecular Pathology & Biochemistry, 2024; 5: 179.
15. Yaran Y, Xie B, Yan J. Application of Next-Generation Sequencing Technology in Forensic Science. Genomics, Proteomics & Bioinformatics, 2014; 12: 190–197.
16. Renata B, Mothes B, Jose C, Rafael S, Mario F. Sphingosines Derived from Marine Sponge as Potential Multi-Target Drug Related to Disorders in Cancer Development. Marine Drugs, 2015; 13: 5552-5563.
17. Keith I, Mark N. Immune System effects of Echinacea, Ginseng, and Astragalus: A review. Integrative Cancer Therapies, 2003; 2: 247-267.
18. Kamal A, Rumman I, Sony W, Ono N. Identifying Potential Natural Antibiotics from Unani Formulas through Machine Learning Approaches. Antibiotics, 2024; 13: https://doi.org/10.3390/antibiotics13100971.
19. Chi C. Integrating traditional medicine into modern health care systems: examining the role of Chinese medicine in Taiwan. Social Science & Medicine, 1994; 39: 307-321.
20. Keji C, Hao U. The integration of traditional Chinese medicine and Western medicine. European Review, 2003; 11: 225–235.
21. Omar A, Lakic D, Afonso C, Dramce G. Exploring Muslims' Health-Related Behaviours in Portugal: Any Impact on Quotidian Community Pharmacy Practice? Pharmacy, 2022; 10: https://doi.org/10.3390/pharmacy10030055.
22. Zhao Z, Li Y, Sun J, Zhou L, Xie B. Prevention and treatment of COVID-19 using Traditional Chinese Medicine: A review. Phytomedicine, 2021; 85: https://doi.org/10.1016/j.phymed.2020.153308.
23. Xiang Y, Guo Z, Chen J, Huang Y. Traditional Chinese medicine as a cancer treatment: Modern perspectives of ancient but advanced science. Cancer Medicine, 2019; 8: https://doi.org/10.1002/cam4.2108.