WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.084
Volume 12, Issue 1, 393-406. Review Article ISSN 2277– 7105

A REVIEW ARTICLE ON: CURRENT SCENARIO AND FUTURE PROSPECT OF HERBAL MEDICINE; ALOE-VERA, ASHWAGANDHA, VINCA, GINGER, TURMERIC

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Article Received on
13 November 2022,
Revised on 02 Dec. 2022,
Accepted on 23 Dec. 2022
DOI: 10.20959/wjpr20231-26657

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ABSTRACT

In malignancy of inconceivable advances in modern science, technology and allopathic drug a large we are unfit to give quality healthcare to all. Traditional drug particularly herbal drug considered as a major healthcare provider around the globe particularly in pastoral and remote areas. A large section of people depends on similar drug for their primary healthcare substantially in underdeveloped or developing countries. Indian traditional medicinal system like Ayurveda, Siddha and Unani has a veritably rich history of their effectiveness; modern exploration also conceded the significance of similar drug. Indian traditional drug or medicinal shops are also considered as a vital source of new medicine. The critical need for the development of a sensible nonsupervisory environment encouraging the blessing of botanicals as medicines is emphasized. After prognosticating a bright future for rational phytomedicines, the author opines that numerous of them will ultimately play significant places in medicinal practice.

KEYWORDS: Indian traditional medicine, Ayurveda, Herbs, Dietary supplements.

INTRODUCTION

In current scenario medical science has made incredible advances all over the global. Right now the immune system are get decrease day by day dew to busy life style, a lot of new life

saving drugs discovered which helps us to fight against several infection and other diseases, and new advancement in the field of technology has boosted the capacity of modern science. In which get incredible advancement whether such benefit of modern medicine has reach to the every door. Majority of world population mainly in developing and underdeveloped countries does not have access to modern medicine and depends on the time-tested traditional/alternative or complementary systems of medicine, many of these systems is much older compared to the allopathic medical science. In the 21st century, pollution, unhealthy lifestyle, environmental toxins increases the risk of diseases. Therefore, the world is looking for cost effective, easily available, better physiological compatible traditional systems of medicine and holistic approach to avert such problem and provide the basic healthcare to all. Herbal medicine is still the mainstay of about 75 - 80% of the world population, mainly in the developing countries, for primary health care. This is primarily because of the general belief that herbal drugs are without any side effects besides being cheap and locally available. According to the World Health Organization (WHO), the use of herbal remedies throughout the world exceeds that of the conventional drugs by two to three times. The use of plants for healing purposes predates human history and forms the origin of much modern medicine. Many conventional drugs originated from plant sources: a century ago, most of the few effective crude drugs plant are Alove, Ashwagandha, Turmeric, Vinca, Ginger. Medical history from the beginning of time is filled with descriptions of persons who used herbs to heal the sick of the society. Herbal medicine was also an effective healing method, but was viewed less enthusiastically Herbal.

Due to their effectiveness, low toxicity, and lack of side effects, herbal medications are gaining more and more attention. A renewable, nonexhaustive source of bioactive chemicals is the global flora. On the basis of commercial demand, the Indian government has fostered the growth of 32 plant medications while outlawing 29 endangered species of medicinal plants from their natural habitats. However, environmental considerations in connection to therapeutic effectiveness and potent phytoconstituents are frequently disregarded when it comes to plant medication cultivation. Due to the inclusion of harmful ingredients, less than 0.5% of Indian herbal pharmaceuticals are demanded in the global market.

HERBAL MEDICINE

The WHO has recently defined traditional medicine (including herbal drugs) as comprising therapeutic practices. Traditional medicine is the synthesis of therapeutic experience of

generations of practicing physicians of indigenous system of medicine. Traditional preparations comprise medicinal plants, minerals and organic matter etc. Herbal drugs constitute only those traditional medicines which primarily use medicinal plant preparations for therapy.

HERBAL MEDICINE AND ITS IMPORTANCE

Plants are always the key source of the chemical constituent of drug or treatment strategy in different traditional medicinal systems. In current years, many people are choosing to plant based medicines or products to improve their health conditions. According to the WHO, herbs or herbal products are used by the large number of populations for basic healthcare needs. Herbal medicine includes herbs, herbal materials (like plant parts) or preparations, processed and finished herbal products, active ingredients. In recent years, a huge use of herbal product due to the side effects of modern drugs, failure of modern therapies for against chronic diseases, and microbial resistance. It is estimated that nearly 75% of the plant are produced therapeutic effect worldwide were included from traditional/folk medicine. In India, approximately 70% of modern drug are discovered from natural resources and number of other synthetic analogues have been prepared from prototype compounds isolated from plants. It was reported that more than 60% of cancer drug available in market or in testing are based on natural products. Currently, about 80% of antimicrobial, immune suppressive, cardiovascular, and anticancer drugs are derived from plant sources. More than 70% entities among 177 anticancer drugs approved are based on natural products or mimetic. About 25% prescription drug found globally are derived from plant sources, and nearly 121 such drugs are in use.

THE DISTINCTION BETWEEN HERBAL AND PRESCRIPTION DRUGS

Herbal medicine and conventional medication have three key differences despite appearing to be identical on the surface. Utilize of Whole Plants - Herbalists typically use unpurified plant extracts that contain a variety of constituent parts. These are said to interact synergistically such that the combined effect of the herb as a whole is higher than the sum of its individual effects. Additionally, it is asserted that using whole herbs as opposed to separated active components (or "buffering") reduces toxicity. Although the amounts of the constituent substances in two samples of a particular herbal drug may differ, practitioners assert that this generally does not result in clinical issues. There is some experimental support for synergy and buffering in some whole-plant formulations, but it is unclear if this holds true for other

herbal remedies. the products (Vickers and Zollman, 1999). Combining herbs: Several distinct herbs are frequently used in combination. The principles of synergy and buffering are said to apply to plant combinations, and practitioners assert that mixing herbs increases efficacy and lessens side effects. Contrary to standard practise, which normally avoids polypharmacy wherever possible. Diagnosis: Compared to conventional practitioners, herbalists utilise alternative diagnostic principles. To treat arthritis, for instance, they would see "low functioning of a patient's symptoms of elimination" and determine that the arthritis is brought on by "an accumulation of metabolic waste products." Then, in addition to herbs with anti-inflammatory characteristics, a diuretic, cholerectic, or laxative combination of herbs may be administered.

REASONS FOR USING HERBAL MEDICINE

The earliest indications of human usage of plants for healing stretch back to the Neanderthal era. An rising number of people are now using herbal remedies.number of patients who typically fail to disclose concurrent use to their doctors (Miller, 1998). Patients seek out herbal treatments for a variety of causes. A "feeling of control, a mental comfort from taking action" is frequently mentioned, which helps explain why many patients who use herbs have chronic or incurable ailments like diabetes, cancer, arthritis, or AIDS. They frequently feel that traditional medicine has failed them in these circumstances. Home remedies are frequently used by patients for acute, frequently self-limiting diseases like a cold, sore throat, or bee sting because professional therapy is frequently unavailable right away, too inconvenient, expensive, or time-consuming. In rural areas there are additional cultural factors Encourage the use of plants, such as B. the environment and culture, a “man-land relationship”. people believe that When an area leads to a particular disease, so will it supporting plants that can be used for healing.

In India, a large part of the rural population has no Assessment of Modern Medicine. a hundred of primary health centers for rural areas, lack of staff, diagnostic facilities and adequate supplies drug. The rural populations highly dependent traditional medical systems. Natural plant products are considered healthier than manufactured drug. Additionally, report side effects of conventional medications can be found in the lay press at a much higher rate than herbal reports Toxicities, due in part to adverse effect monitoring mechanisms for conventional drugs, these data exist by themselves treatment is more difficult to determine. Doctors often also regard the herb as a harmless placebo.

A GUIDE TO HERBAL MEDICINE REGULATION

Herbal treatments come in a variety of forms, from plants that people gather themselves and then consume for health reasons to products that have been approved by the FDA. Over 80% of herbal sales are believed to be made up of unlicensed remedies, which fall between the two extremes of this regulatory range. Legally, industrially manufactured herbal products must receive marketing authorization from the European Union if their function, presentation, or both fall under the definition of a therapeutic product. Unfortunately, it is challenging to draw a precise borderline. Due to the hefty licensing fee and the lack of sufficient data on efficacy, safety, and quality, many medicine-like products sold on the British herbal market remain unregistered. In Germany, where regulatory evaluations of medicinal herbs have been outlined in more than 300 monographs, special licensing procedures for herbal medicines are already in place. In France, more than 200 herbs have been designated as permissible components of phyto medicines. Australia devised a comprehensive strategy for the herbal market that will also include a number of herbs from other cultures. The National Institute of Medical Herbalist, located in Exeter, is the primary organization responsible for Western herbal practitioners' registration and regulation.

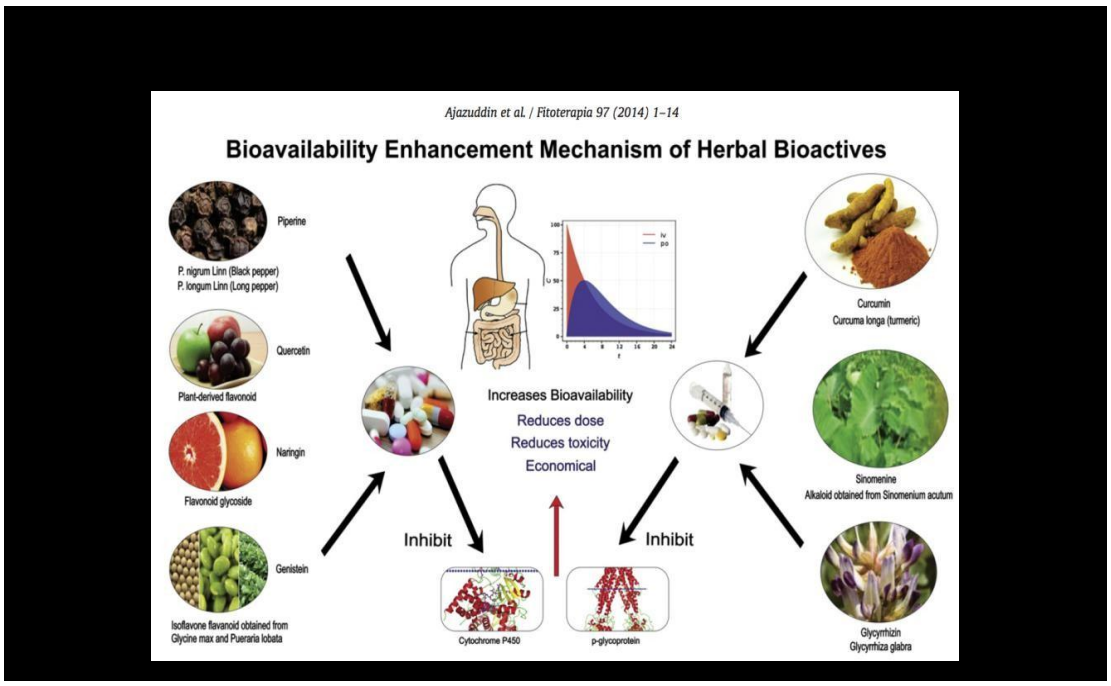

Fig: 01: Phyatochemical medicine action.

CURRENT HERBAL SITUATION

Medicine has been reported that 70% of all medical practitioners in France and Germany regularly prescribe herbal medicine, demonstrating that the widespread use of herbal

medicine is not only prevalent in developing nations. Additionally, there is a sharp increase in the number of patients using herbal therapies. The market for herbal goods is booming as a result of the US Food & Drug Administration (FDA) loosening regulations for the selling of herbal supplements. According to the figures that are now accessible, the market for herbal medicines in the European Union in 1991 was estimated to be worth $6 billion (it may be over $20 billion now), with Germany accounting for $3 billion, France for $1.6 billion, and Italy for $0.6 billion. In 1996. The market for herbal medicines in the US was over $4 billion, and it has since grown. About $1 billion worth of herbal drugs are sold in India, while about $80 million worth of herbal crude extract is exported. A weird thing has happened to herbal medicine over the past few decades. It has made a comeback rather than being eradicated by medical research and pharmaceutical chemistry. Herbal therapies and effective plant medicine have profited from the objective evaluation of medical research, which has thrown out irrational and sentimental promises for herbal cures. And it has been discovered that herbal medicine has some outstanding qualifications. Despite being empirically developed through trial and error, many herbal remedies were very successful. According to a recent study, 80% of antibacterial and anticancer medications were derived from natural ingredients, and 39% of the 520 new approved drugs between 1983 and 1994 were natural products or derived from them.

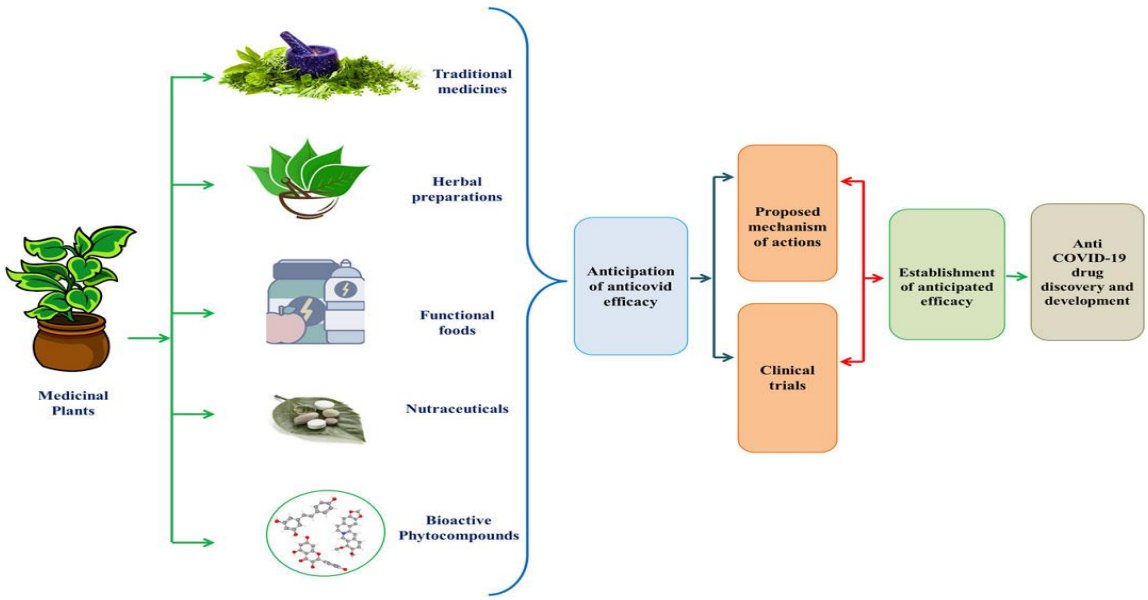

Fig 02: Plant medicinal supplement.

DIFFERENT TYPES OF HERBAL AND CONVENTIONAL DRUGS

- ALOVE

- ASHWAGANDHA
- TURMERIC
- VINCA
- GINGER

ALOVE

Considering the modern scenario because of the pandemic of COVID-19, humans sense insecure approximately the merchandise they may be the use of their every day life. Therefore, the call for anti-microbial merchandise is growing day-by-day. In this sort of scenario, nanotechnology can play a important position with inside the improvement of antimicrobial merchandise. Nanotechnology is a totally wide area and it is able to be similarly labeled into nanoparticles, nanorods, nanodisks, nanowire, nanofibers, and nanotubes. Keeping in view the modern scenario of COVID-19, nano fibers can play an essential position with inside the improvement of antimicrobial merchandise .The use of aloe vera is being promoted for a big sort of conditions. Often widespread practitioners (gps) appear to recognize much less than their sufferers approximately its alleged benefits. The Department of Complementary Medicine on the University of Exeter gets extra enquiries from colleagues associated with aloe-vera than for any different natural remedy. Considering this excessive stage of interest, it's far applicable to study systematically the proof for or towards its medical effectiveness. Aloe-vera (synonym: Aloe barbadensis Miller) belongs to the liliaceal family, of which there are approximately 360 species. Aloe-capensis (Cape aloes) belongs to a one-of-a-kind species. Aloe-vera is a cactus-like plant that grows without difficulty in hot, dry climates and currently, due to demand, is cultivated in big quantities. Cosmetic and a few medicinal merchandise are crafted from the mucilaginous tissue with inside the centre of the aloe-vera leaf and referred to as aloe-vera gel. The peripheral package deal sheath cells of aloevera produce an intensely bitter, yellow latex, generally termed aloe-juice, or sap, or aloes. Aloe-vera sap and aloe-vera gel are regularly confused. Unlike aloes, aloe vera gel carries no anthrax-quinones, which can be liable for the sturdy laxative outcomes of aloes. However, overall leaf extracts might also additionally comprise anthrax-quinones. Although maximum commercially to be had merchandise are primarily based totally on the gel, the British Pharmacopoeia does now no longer comprise an access for aloe-vera gel however it does describe aloes. The pharmacological movements of aloe-vera, as studied in-vitro or in animals (in maximum instances the full leaf extract changed into used), consist of anti inflammatory and anti-arthritic activity, and antibacterial and hypo-glycaemic

effects. Aloe-vera has been used for medicinal functions in numerous cultures for millennia: Greece, Egypt, India, Mexico, Japan, and china. The healing claims made for aloe-vera variety over a huge listing of conditions, as do the pharmacological sports related to it. Most of those claims are primarily based totally on ancient use as opposed to tough proof. Aloe-vera consists of seventy five doubtlessly energetic constituents: vitamins, enzymes, minerals, sugars, lignin, saponins, salicylic acids, and amino acids. four box summarizes its maximum essential constituents. Five the medical use of aloe vera is supported in most cases through anecdotal data. While such reviews are exciting and applicable for formulating hypotheses, managed trials are important for outlining its effectiveness greater conclusively. The purpose of this systematic evaluate changed into to summarize all managed medical trials on aloe-vera arrangements on the way to imparting proof for or towards its medical effectiveness.

Fig 04: Alove.

ASHWAGANDHA

The plants have an edge over synthetic ones when it comes to the need for new pharmaceuticals to enter the market because of their greater chemical diversity and resulting changes in biological function. The screening and assessment of their phyto-pharmacological effects are crucial for the study and development of newer prospective herbal medications. When developing synthetic medications, which combine chemical structures with as-yet-unexplored physicochemical features, the biodiversity and plant assets are frequently the starting point. Regarding this, investigated the therapeutic potential of Withania somnifera Dunal (Solanaceae). Withania somnifera is a plant that mainly grows in dry areas of Asian nations including India, Pakistan, Afghanistan, South Africa, and others. It is referred to as

"Indian Ginseng" by academics and has a wide range of therapeutic uses, such as anti-inflammatory properties, effects on the immune system, circulatory system, diabetes, the central nervous system, etc.

Fig:04- Ashwagandha

TURMERIC

The usage of turmeric in food, cosmetics, and medicinal is widespread. In South Asian and Middle Eastern cuisine, it is a common spice. Curry gets its distinct yellow colour and flavour from it. In cheese, butter, and other foods, it serves as a colouring agent. Turmeric has been utilised for therapeutic purposes in folk medicine for many years in various parts of the world. In Ayurvedic methods, turmeric is said to provide a wide range of therapeutic benefits, including boosting bodily energy, reducing gas, getting rid of worms, enhancing digestion, controlling menstruation, removing gallstones, and alleviating arthritis. It is employed as an antiseptic and antibacterial agent in several South Asian nations for cuts, burns, and bruises. It is a common treatment for digestive diseases such irritable bowel syndrome-related abdominal pain in Pakistan as well as an anti-inflammatory and anti-inflammatory drug. In addition to its Ayurvedic uses, turmeric is used in India to treat skin disorders and purify the blood. Turmeric paste is utilized by girls in a few components of India to cast off superfluous hair.

Turmeric paste is carried out to the pores and skin of the bride and groom earlier than marriage in a few components of India, Bangladesh, and Pakistan, wherein it's miles believed to make the pores and skin glow and preserve dangerous microorganism far

from the body. Turmeric is presently used with inside the method of numerous sunscreens. Several multinational groups are concerned in making face lotions primarily based totally on turmeric.

Fig 05: Turmeric.

VINCA

Vinca alkaloids have been utilised as anticancer drugs for more than 30 years because their cl inical utility was clearly shown as early as 1965.

With the current registration of two natural substances, vinblastine and vincristine, as well as two semi-synthetic derivatives, vindesine and vinorelbine, vinca alkaloids can be regarded as a chemical class with clear application in cancer chemotherapy.

Today, only a few few organisations are engaged in active Vinca alkaloids chemistry research.

However, a new family of similar chemicals was created utilizing super acidic chemistry, and vinflunine, a difluorinated derivative, was chosen for clinical testing. Analyzing the pharmacological information about these novel derivatives suggests that there isn't a clear relationship between in vitro and in vivo outcomes.

Relationships between structure and activity have also been ineffective in aiding the chemist in rational design. The fact that the Vinca binding site(s) on tubulin and the precise mechanism(s) of action of Vinca alkaloids are still unknown limits the rational creation of

novel derivatives. However, preclinical analyses of the new derivative vinflunine have already indicated that several in vitro assays, in addition to in vivo tests, might be suggested to choose newer generation Vincas in a more logical manner. Furthermore, recent research has shown that some recently discovered properties, like antiangiogenic activities, may expand the therapeutic applications of natural and semi-synthetic Vinca alkaloids. As a result, future anticancer treatments will continue to be interested in the Vinca alkaloids drug family.

Fig 06: Vinca.

GINGER

Ginger is popularly consumed in the form of ginger ale or ginger sticks. If these are consumed while travelling, the traveller inhales a herb that treats motion sickness, albeit unconsciously. Numerous excellent clinical investigations have conclusively demonstrated the effectiveness of ginger rhizome in preventing nausea, dizziness, and vomiting as symptoms of motion sickness (kinetosis), as well as in treating postoperative vomiting and pregnancy-related vomiting. Scientific research supports the use of this traditional medication for digestive issues (stimulation). For a long time, ginger has been utilised as a natural motion sickness remedy. Nevertheless, it is unclear how it works. By preventing gastrointestinal dysrhythmias from forming and the rise of plasma vasopressin, ginger, according to our hypothesis, reduces the nausea brought on by motion sickness. In a crossover-design, double-blind, randomised placebo-controlled study, thirteen volunteers with a history of motion sickness underwent circular vection while their plasma vasopressin levels, electrogastrographic recordings, and nausea (scored 0-3, i.e., none to severe) were measured with or without ginger pretreatment. A 2.5 +/- 0.2 maximum nausea score was brought on by circular vection, which also elevated plasma vasopressin levels and tachygastric activity.

Plasma vasopressin, nausea, and tachygastria were all decreased by pretreatment with ginger (1,000 and 2,000 mg). Additionally, ginger reduced the recovery period following the cessation of vection and increased the delay before the start of nausea. Ginger pretreatment (2,000 mg) had no effect on the nausea or enhanced bradygastric activity brought on by intravenous vasopressin infusions at 0.1 and 0.2 U/min. Ginger efficiently lowers circular vection-induced vasopressin production, tachygastrointestinal activity, and nausea. In this way, ginger might function as a cutting-edge substance for the management of motion sickness.

CONCLUSION

The wide spread use of herbal medicine is not restricted to developing countries. The rebirth of herbal medicine, especially in developed countries, is largely based on a renewed interest by the public and scientific information concerning plants. Herbal remedies are popular among patient with chronic diseases. Classically trained physicians cannot ignore herbal medicines any more. They must realize that large number of patients are using herbal medicines. They must have adequate knowledge and should be more open to discuss with their patient regarding herbal medicine. Patient disclosure of herbal use may provide an opportunity for the physician to redirect the patient towards effective conventional health care. By taking a complete drug and supplement history, a dialogue can be initiated to rationally compare the appropriateness of herbal remedies and regulated pharmaceuticals in relation to the severity of the condition. Patient with chronic conditions such as AIDS or cancer should also be warned that some of the adverse effect of herbals are often similar to symptoms of problem associated with their disease or treatment, thus making it difficult to discern if the disease or the “remedy” is the problem. For the herb-using patient who views conventional medicine with ambivalence, the physician can foster a more open and communicative relationship by demonstrating an objective understanding of both alternative and conventional approaches. Finally, doctors should monitor the perceived benefits and adverse effect of self prescribed herbal treatments consumed by their patients, and bears in mind the possibility of herb-drug interactions. The public should be better protected and informed on herbal medicine, and doctors should take an active part in this process (Ernst, 2000).

REFERENCES

1. World Health Organization. WHO Traditional Medicine Strategy 2014e2023. Geneva: World Health Organization, 2013.
2. Pan S, Litscher G, Gao S, et al. Historical perspective of traditional indigenous medical practices: the current renaissance and conservation of herbal resources. Evid Based Complement Altern Med, 2014; 2014: 1e20. http://dx.doi.org/10.1155/2014/525340.
3. Sen S, Chakraborty R, De B, Ganesh T, Raghavendra HG, Debnath S. Analgesic and inflammatory herbs: a potential source of modern medicine. Int J Pharma Sci Res, 2010; 1: 32e44.
4. Sen S, Chakraborty R, De B, Mazumder J. Plants and phytochemicals for peptic ulcer: an overview. Phcog Rev, 2009; 3: 270e279.
5. Sen S, Chakraborty R, De B. Challenges and opportunities in the advancement of herbal medicine: India's position and role in a global context. J Herb Med, 2011; 1: 7e75.
6. Wachtel-Galor S, Benzie IFF. Herbal medicine: an introduction to its history, usage, regulation, current trends, and research needs. In: Benzie IFF, Wachtel- Galor S, eds. Herbal Medicine: Biomolecular and Clinical Aspects. 2nd ed,. Boca Raton (FL): CRC Press/Taylor & Francis; 2011. Accessed from: http://www.ncbi.nlm.nih.gov/ books/NBK92773/.
7. Pan S, Zhou D, Gao S, et al. New perspectives on how to discover drugs from herbal medicines: cam's outstanding contribution to modern therapeutics. Evid Based Complement Altern Med, 2013; 2013: 1e25. http://dx.doi.org/10.1155/2013/627375.
8. Arora, R. B., Basu, N., Kapoor, V. and Jain, A. P. Anti- inflammatory studies on Curcuma longa L. (Turmeric). Indian J. Med. Res, 1971; 59: 1289.
9. Anjaneyulu, V. S. R. and Krishnamurthy, D. Turmeric in Andhra Pradesh. Indian Spices, 1968; 5(1): 8.
10. Alexander, J. and Krishna Rao, G. S. The chemistry of ar- turmerone, atlantone, and related monocyclic sesquiterpenoid ketones. Flavour Ind, 1973; 4: 390.
11. Ahuja, M. M. and Nigam, S. S. Chemical investigation of the essential oil obtained from the rhizomes of Curcuma amada Roxb.. Riechst. Aromen, Koerperpflegem. (in German), 1971; 21: 213.
12. Abraham, C. C. Insect pests of stored spices and their control. Arecanut and Spices Bull, 1975–76; 7(1): 4.
13. Pizzorno L. U., Pizzorno J. E. Jr., Murray M. T., Natural medicine instructions for patients, 2002; 374.

14. Rudolph, K. L. et al. Longevity, stress response, and cancer in aging telomerase-deficient mice. Cell, 1999; 96: 701–712.
15. Kamboj V. P., Herbal medicine, Current Science, 2000; 78(1): 35-39.
16. Zahiruddin S., Basist P., et al.Ashwagandha in brain disorders: A review of recent developments Journal of Ethnopharmacology, 2020; 257: 112876.
17. Panda S, Kar A. Evidence for free radical scavenging activity of ashwagandha root powder in mice. Indian J Physiol Pharmacol, 1997; 41: 424-426.
18. Devi PU. Withania somnifera dunal (ashwagandha): potential plant source of a promising drug for cancer chemotherapy and radiosensitization. Indian J Exp Biol, 1996; 34: 927-932.
19. Gidding CE, Kellie SJ, Kamps WA, de Graaf SS. Vincristine revisited. Crit Rev Oncol Hematol, 1999; 29: 267–87.
20. Bennouna J, Delord JP, Campone M, Nguyen L. Vinflunine: A new microtubule inhibitor agent. Clin Cancer Res, 2008; 14: 1625–32.
21. Himes RH. Interactions of the catharanthus (Vinca) alkaloids with tubulin and microtubules. Pharmacol Ther, 1991; 51: 257–67.
22. Gregory RK, Smith IE. Vinorelbine: A clinical review. Br J Cancer, 2000; 82: 1907–13.
23. Jackson DV, Jr, Bender RA. Cytotoxic thresholds of vincristine in a murine and a human leukemia cell line in vitro. Cancer Res, 1979; 39: 4346–9.
24. Vasala P.A., 18 - Ginger, Handbook of Herbs and Spices (Second edition)Volume 1 Woodhead Publishing Series in Food Science, Technology and Nutrition, 2012; 319-335.
25. Govindarajan V. S. & Connell D. W., Ginger — chemistry, technology, and quality evaluation: Part 1,C R C Critical Reviews in Food Science and Nutrition, 1983; 17(1).
26. Shukla Y., Singh M., Cancer preventive properties of ginger: A brief review, Food and Chemical Toxicology, 2007; 45(5): 683-690.