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Review Article

Ayurveda - A glance

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Ayurveda has the distinction of being the "oldest medical system known to man and the oldest and most comprehensive spiritual teachings in the world". Ayurveda is based on the principle of maintaining a balance between the interrelated relationships within the body and mind. It helps the patient to understand the benefits of knowing their body and mind and to live in intimate relationship with nature. Ayurvedic literature has remedies for age-related diseases like memory loss, osteoporosis, diabetic wounds, etc. for which no efficient medicine is available in modern therapy. Even though Ayurveda has a sound literature background, ironically its share in the global medicinal market is very less (0.5%). In order to promote Ayurveda in the international market, ayurvedic drugs should be available in standardized form, which is the minimum requirement for introducing a product in the Western market. Ayurvedic formulations should be standardized on the basis of active principle or major compound(s) along with fingerprints. There as great scope for India to achieve global leadership of traditional medicinal market through export of quality products from Ayurvedic medicinal system. This article gives an overview of Indian traditional medicinal system-Ayurveda. It also highlights the principle of ayurvedic therapy, current status of Ayurveda, the challenges faced by Ayurveda in the modern world and the need of science based research to overcome its drawbacks. According to Caraka -"The Science of life shall never attain finality. Therefore humility and relentless industry should characterize your endeavor and your approach to knowledge. The entire world consists of teachers for the wise and enemies for the fools. Therefore, knowledge, conducive to health, longevity, fame and excellence, coming from even an unknown source, should be received, assimilated and utilized with earnestness".

Keywords: Ayurveda, Traditional medicinal systems, Ayurvedic therapy, Herbal drugs

In the beginning of the first millennium AD, there were mainly three principal medical systems: Ayurveda, Greek and Chinese medicine. The fundamental principle of the relationship between the man and nature was more or less same in all the medical systems, but their approach in therapy was different (Subbarayappa, 2001) Among the three ancient medicinal systems Ayurveda emerged as one of the world's classic medical practice with the renewed interest in the interaction between religion

and spirituality with health and medicine **(**Chattopadhyay, 2007). Ayurveda is one of the oldest natural healing systems of the Vedic Sciences which originated in India approximately 5000 years ago and is often called the "Mother of All Healing". The literal meaning of Ayurveda is "The Science of Life"; it's the combination of two Sanskrit words *ayur* (life) and *veda* (science or knowledge) (Lad, 2003). Life here does not refer to life of an individual but to the life of the entire universe in which the individual is part of it. Ayurveda allows the individual to understand their body, mind and soul at its deepest level and experience the wisdom of this knowledge to appreciate the conscious that is present in the entire universe.

Origin of Ayurveda

According to Indian mythological concept Ayurveda originated from Brahma, the God of Creation. Hindu myth says that, Brahma wants to ease the sufferings of his creation by transferring the knowledge of Ayurveda to deities. Dhanvantari was one of those deities, who then transferred this knowledge of science to modern world. Dhanvantari is considered as "Father of Ayurveda". The roots of Ayurveda are generally traced to the *Atharavaveda* (circa 1500 BC), which has numerous hymns relating to practical and scientific information on various subjects beneficial to the humanity like health, disease, anatomy, philosophy, engineering and astrology (Valiathan, 2009). During Vedic period, Ayurveda was merely like as priestly or religious medical practice, in which the Brahmans who perform religious rituals were also considered as *Vaidyas*. According to *Vaidyas*, the religion and spirituality was intertwined with health, this knowledge was acquired through direct cognition during meditation. Vedic knowledge reveals that there was keen observation by the priests. But the cure of the disease was expected to be because of magic power of amulets, 'expulsion' of disease causing demons through propitiation and exorcism and invocations to a god or gods who were supposed to be specifically beneficial for curing a particular disease. The Magical and religious aspect of medicine in the Vedas was gradually supplemented by observations based on scientific thinking. During this age appellation of Ayurveda took place in a systematic approach without the neglection of its root in Atharavaveda. Thus Ayurveda emerged not merely to be elite but also to be laity (Subbarayappa, 2001). An important development in the Vedic medicinal practice was the use of Herbal formulation for treatment. Thus Ayurveda developed itself as a classic medical system from faith based to reason based practice.

Sources of Ayurvedic literature

Atharavaveda was the earliest authentic text in Ayurveda which discusses about the nature of existence, health and disease, pathogenesis and principles of treatment. It also describe about the tridoshas and the use of herbs to heal the diseases of body and mind. The knowledge of Vedas was gathered and systematically arranged to form "Samhitas" which became fundamental texts of Ayurveda, and are even used today by the students and practitioners. Caraka and Susruta sarnhitas are the classic Ayurvedic texts, in which *Caraka Samhita* (-900 B.C.) work on internal health and therapeutic methods. *Susruta Samhita* (-600 B.C.) describes about surgical orientation and descriptions of operations and instruments (Dev, 1999). The last of the 'Great Three' of Ayurveda *Astanga*

hrdaya was composed by Vagbhata. These texts deal with all aspects of life, health, disease and treatment. The Samhita phase of the 'Great Three' was regarded as the golden age of Ayurveda, which was systematized and taught and practiced all over India. The *Madhava Nidana* (-800-900 A.D.) was another famous Ayurvedic work in ancient literature on the diagnosis of diseases (Majumdar, 1971). Bhava Mishra is considered as the last celebrated writer in Ayurvedic medicine for his esteem work *Bhava Prakasha* written around 1550. This book is still referred by modern practitioners for its description of approximately 470 medicinal plants (Pandey, 1960). These Samhitas and ayurvedic literature were translated to various languages and the science of Ayurveda spread throughout the Asian subcontinent.

Stagnation and upwelling of Ayurveda

After *Vagbhata,* the golden age of Ayurveda came to an end. A period of stagnation followed Ayurveda over thousands of years without much contribution to this medical practice. The knowledge of surgery almost disappeared from the mainstream of Ayurveda and was practiced by local practitioners who transferred their knowledge to next generation (Valiathan, 2009). Foreign invasion was a beginning of the decline of Ayurveda. Ayurveda was a religious science of healing, the anti-Hindu and anti Buddhist approach of Muslim invaders lead to the withdrawal of Ayurvedic system to local communities and families. British invasion also pay way for the decline of Ayurvedic system. It was during the British invasion, Western medicinal practices like Allopathy and homeopathy introduced in India (Raman, 2007). Nineteenth century encountered an unprecedented revival of Ayurveda from its stagnant condition. The upwelling of Ayurveda from its neglected state was contributed by several brilliant scholars like P. S. Varrier at Kottakkal, Lakshmipathy in Madras, and Ramnath Chopra from Calcutta (Valiathan, 2009). Today Ayurveda emerged as one of the oldest medical system which can be considered as Complementary and Alternative Medicine (Hankey, 2005) and also as a whole medical system. Ayurveda is a holistic approach which gives more emphasis on prevention and encourages maintaining the health by balanced life with right thinking, diet, life style and herbal remedies.

Science of Ayurveda

Ayurveda can be considered as intellectual coherence, which deals with the equilibrium or the harmony of both mind and the physical body as a pre-requisite for a healthy and purposeful life, and for the realization of human goals -*dharma, artha* and *kam.* According to Ayurveda universe is considered as macrocosm and the human body as microcosm. The constituents of external universe are identical to that of small internal universe within the body. This is the dominant theme in Ayurveda (Valiathan, 2009). Every living and non living entity is constituted by five primordial principles or mahabhoota *Prithvi, Jela, Theja, Agni* and *Vayu*. The tissues of the body are also composed of these five elements and their derivatives (Bhusan Patwardhan, 2009). This identity of composition is the central principle of ayurvedic therapeutics which mandates the choice of drugs and food without causing side effects. Ayurveda is a holistic science of health care with the basic concept, that the human body is a matrix of "*seven dhatus*" or basic body tissues (*Rasa,*

Rakta, Mansa, Meda, Asthi, Majja, Shukra) and mainly "*three Malas*" or waste products of the body, such as feces, urine and sweat and "*Agni*" considered as the biological fire, performing all digestive and metabolic activities of the body, and "*three life forces or energies*" called tridosha "*vata, pitta and kapha*". Any imbalance or disturbance in these basic principles of body causes disease (Pulok K Mukherjee, 2005). According to Ayurvedic beliefs each person is unique with a specific Constitution or *Prakriti*. Constitution is the combination of physical, psychological and emotional characteristics and the way the body functions to maintains proper health. *Prakriti* is unique fingerprint of an individual. Several external and internal factors act upon to change the constitution of the body from the balanced state. Health is the equilibrium or balance among the *tridoshas* in the body, and their disequilibrium or imbalance would be the diseased-state or *Vikriti* (Bala Manyam, 2005).

Principle of Ayurveda

Ayurveda identifies that there are three basic types of energy in the body mainly *vata, pitta* and *kapha*. *Vata* is the energy of movement. It controls bodily functions associated with motion, including blood circulation, breathing, blinking, muscle and tissue movements, heartbeat and movements of cytoplasm and cell membrane. Balanced state of *Vata* energy will result in creativity and vitality. Imbalanced state, *vata* creates fear and anxiety. *Pitta* is the energy of digestion and metabolism. It controls the body's metabolic systems, including digestion, absorption, assimilation, nutrition, metabolism and temperature. In balanced state, *pitta* leads to contentment and intelligence while in imbalanced state, *pitta* cause ulcers and arouse anger. *Kapha* is the energy of lubrication and structure. This energy controls growth of the body. It supplies water to all body parts, moisturizes the skin, lubricates the joints and bones and maintains the immune system. Balanced condition of *kapha* is required for the expression of love and forgiveness. Imbalance may lead to insecurity and envy (Lad, 2003). Equilibrium between the Doshas and their governing factors are required for proper health, which is the central dogma of Ayurveda. Every individual has a unique composition of *tridoshas* in their body. Usually one of the doshas will be prominent, other will be moderate and the third will be least prominent. *Vata* is more dominant under normal condition and controls the other two energy principles, *Pitta* and *Kapha* (Sharma, 2010). Any imbalance in a dosha will leads to various kinds of ailment (*Vikriti*) and their symptoms. Food (*ahara*), Drugs (*aushada*) and Lifestyle (*vihara*) are the important factors that maintain the balance in a human body (Bhusan Patwardhan, 2009). Imbalance in the central dogma of Ayurveda can be caused by external factors like unhealthy diet, bad habits, more mental stress and climatic changes. Equilibrium or balance is regained for maintaining health in Ayurveda by implementing new life style, appropriate diet and use of herbal drugs.

Diagnosis and treatment

The triumph of ayurvedic treatment lies in the diagnosis and the choice of herbal remedies. Ayurvedic system recognizes the fundamental importance of examining a patient by direct perception. An ayurvedic physician should have thorough textual knowledge and should be able to evaluate the key symptoms and correlate it with the

imbalance of doshas (Lad, 2005). Physician should employ all senses to identify the disorder. Diagnosis can be done by interrogation, inspection, palpation, listening to bowel sounds and observing the tongue, and many. Systematic interrogation with the patient helps the physician to get clear picture about the history of disease and its environmental aspects. Even though there is no mentioning about the pulse diagnosis in the classical ayurvedic texts, it is widely used by physicians nowadays to identify the nature and extent of doshas (Subbarayappa, 2001).

Once diagnosis is determined in terms of imbalance in doshas, treatment should begin without delay. Ayurvedic therapy starts with mild measures like changing the life style and diet to eliminate the errors of the doshic imbalance. According to ayurvedic texts, Ayurvedic compendium also known as Astanga Ayurveda comprises eight branches: *Kayacikitsa* (internal medicine); *Salya tantra* (surgery); *alakya tantra* (ophthalmology and ENT); *Kaumara brhtya* (paediatrics, obstetrics and gynaecology); *Agada tantra* (toxicology); *Rasayana* (geriatrics and nutrition); *Vajikarana* (sexology); *Bhuta vidya* (psychiatry and demonology) (Ravishankar, 2007). Physician prescribe particular treatment regime based on the perturbed doshas. Treatment given should be able to counteract and bring the perturbed doshas to normal equilibrium state. Ayurvedic therapy emphasizes on prevention of disease, stabilizing body system and finally improving the lifespan. Ayurvedic medicines prescribed to patients, contains drugs of plant, animal and mineral origin. These ayurvedic formulations has several beneficial like treatment for cancer, treatment for age related problems like loss of memory, treatment for infectious diseases and many. Basic mechanisms like immune modulation, hormonal changes, free radical scavenging, etc. are responsible for biological activity of ayurvedic formulations. *Panchakarma* or cleaning process is also done for some patients in order to remove the toxins accumulated to obtain more benefits of the treatment regime prescribed (Mradu Gupta, 2009). Ayurveda is not only concerned with medicinal therapy, surgical methods are also adopted for the cure of disease. But surgery is only preferred at critical stages when other treatment measures become inadequate. Lifestyle change, dietary regimen, joyful surroundings and faith in the physician and his treatment are equally important as herbal drugs and procedures for successful treatment (Valiathan, 2009).

Ayurvedic therapeutics

In ayurvedic classic texts like '*Charka Samhita*' and '*Susruta Samhita*' the use of plants and polyherbal formulations were documented for health care. Development of Ayurveda and its herbal remedies through ages is a part of cultural heritage of India (Narayana et al., 1998). Ayurvedic formulations are of multi component mixtures, containing plant and animal-derived products, minerals and metals. Most of the ayurvedic therapeutics is polyherbal formulations. This is based on the fact that the therapeutic efficiency of the herbal constituents of plants is enhanced by the synergistic efficacy of other plants (Pulok K Mukherjee, 2005). Various metallic compounds like cinnabar, gold pyrites, lead compounds, mercury, copper compounds, borax, iron pyrites, etc., are also used in ayurvedic formulations. Several pretreatments including sand heating, boiling, smoking, steam heating, sublimation,

evaporation, condensation, oxidation, etc are done on these chemical compounds prior to their addition in herbal formulations. The commonly used ayurvedic drugs are *choornams, kashayams, lehyam, arishtas, aasavas, guikas/pills* or tablets, and *thylam* or oil extractions. There is significant difference in processing steps, even for drugs of the same class. Each step in drug preparation are stringent because a simple errors can affect the efficacy of the Ayurvedic formulation (Gopalakrishanan, 2008). Ayurvedic medicines are administered by externally as eye drops, ointments, etc. and also internally as drugs. The concept of *Anupaan* or vehicle for drugs is quite significant in Ayurvedic treatment. Various vehicles like milk, honey, cold water, etc. are used in Ayurveda. Same ayurvedic formulations with different anupaan can be used for different disease. They accelerate circulation, absorption and assimilation of the drug in the body and enhance therapeutic efficiency (Vaidya Bhagwan Dash, 2002). Time of medicinal intake is significant in case of ayurvedic drugs, which is also disease specific. Duration between the intakes of medication depends on the condition of the patient and the disease. Several precautions must be taken while administering ayurvedic drugs because there are chances for dietic incompatibility. Ayurveda is a complex science in which all the components are equally important for the cure of disease and maintaining balance of body, mind, and consciousness.

Current status of Ayurveda

According to IMS Health reports the global pharmaceutical market is expected to reach $1.1 trillion in 2014. The size of the market is expected to grow nearly $300 billion over the next five years. According to World Health Organization (WHO), three-quarters of the world population relies upon traditional remedies (mainly herbs) for the health care (Anwarul Hassan Gilani, 2005). There is prominent shit from Western medicinal system to Traditional system not only in developing countries, but in developed countries too. WHO estimates that, the present demand for medicinal plants is – US $14 billion a year and by 2050 it would be – US $5 trillion (Aneesh, 2009). Cost effectiveness and fewer side effects are the added advantage of traditional systems compared with allopathic system with harmful side effects and high cost. Ayurveda and Traditional Chinese Medicinal (TCM) system are the most ancient traditional medicinal systems of the world (Bhushan Patwardhan et al., 2005). Due to the increasing demand of the Traditional medicinal system, WHO is very keen in creating guidelines and standards for Herbal remedies (WHO, 2002). Chinese medicinal system gained considerable ground in the international arena by their research and science based approach. Even though Ayurveda is one of the world's oldest traditional medicinal systems with well documented literature accounts, it is struggling hard to establish itself in the international market. India as great opportunities waiting in the areas related to patents and trademarks Aneesh, 2009). India needs to identify the extent to which Ayurvedic therapeutics is safe and effective so that it could get wide global acceptance.

Challenges of ayurvedic drugs

Ayurveda is experiencing renaissance among the consumers through out the world. However one of the major reasons for the impediment of Ayurveda is the lack of

evidence based standard profile. Need for evidence based research has became worldwide trend in medical research. "Absence of evidence is not evidence of absence". There are controversies prevailing the evidence for the efficacy of traditional medicinal systems. Efficacy and validity of traditional medicines should be evaluated with preliminary foundational and clinical studies. Quality and safety aspects of Ayurvedic formulation are also matters of major concern. There is only limited availability of data supporting the efficacy of Randomized Clinical Trials in traditional medicinal systems (Margolin, 1999). Traditional medicinal systems should develop a public health care agenda including all aspects like social and cultural dimensions, sustainability and research strategies. This is essential for the shift of complementary and traditional medicine from the marginal status it holds to a significant role in international health care (Gerard Bodeker, 2002). Another major challenge faced by traditional herbal medicinal system today is the loss of genetic biodiversity or risk of extinction (Lucy Hoareau, 1999). Ayurvedic medicinal system also faces several problems, which prevent it from becoming the world's largest traditional health care system.

Heavy metal toxicity

When 20 ayurvedic medicines purchased from India was analyzed for heavy metal content, 64% contain lead and mercury, and 41% contain arsenic (Robert B Spaer et al., 2004) In some studies it has been found that heavy metal content has exceeded the legal limits in herbal formulations (Itankar, 2001). According to ayurvedic texts, emphasize the relevance of heavy metals in their formulation. Heavy metals are deliberate constituents of traditional ayurvedic medicines (Ernst, 2002). So the term 'contamination' with respect to heavy metal will be inappropriate. They are recommended in many drugs because they have particular biological properties for curing. Toxicity of heavy metals as been well defined in ayurvedic literature. Specific physicochemical processes like sublimation, heating, etc. has been clearly mentioned in order to detoxify the metals. In order to avoid heavy metal toxicity, proper care should be taken while preparing the ayurvedic formulation. There are some accidental contaminations like, preparative contamination and herbs and the minerals used in formulation itself are contaminated (Ernst, 2002). In such cases it won't be fair to disrespect the entire system of medicine. Good Manufacturing Practices (GMP) should be implemented more strictly to overcome this situation (Patwardhan, 2005).

Inadequate scientific data

Even though ayurvedic drugs have well literature documentation, it lacks inadequate scientific data supporting its pharmaceutical properties and efficacy. Science based approach should be introduced for the evaluation of efficacy of the formulations. There is immediate need for scientific research in order to evaluate the pharmacological parameters of herbal formulation. Preparing monographs of the medicinal plants used in ayurvedic formulation will be a scientific reference which includes description, pharmacology, allergic effects, and bioactivity of the plant (Aschwanden, 2001).

Lack of standards for safety, efficacy and quality control

Herbal medicines are generally considered as safer drugs compared to synthetic drugs. But sometimes they are unsafe causing severe side effects like allergy, kidney malfunctioning and even death. The major problems with herbal medicines are the lack of standardization and of safety regulations (Aschwanden, 2001). Identification and characterization of active ingredient of herbal drugs are essential to determine the efficacy of the drug formulation (WHO, 2002). Scarcity of medicinal plants has led to adulteration, substitution with other species and removal of a particular ingredient from the herbal drugs, which in turn effect the quality of formulations (Parimelazhagan and Rahul Chandran, 2010). Quality is the sum of all the factors which contribute directly or indirectly to the safety, effectiveness and acceptability of the product (Vaibhav et al., 2009). World Health Organization (WHO) has formulated guidelines for determination of adverse side effects of traditional medicines used for human application. In order to popularize ayurvedic formulation in global market, we should develop safety limit profile for herbal drugs (Dubey and Pramila Tripathi, 2004).

According to Ayurvedic literature quality control measures should begin from the time and place of collection of herbs till the finished product (Ankit Gupta et al., 2009). World Health Organization (WHO) has developed a detailed catalogue for quality control methods for herbal drugs (WHO, 1998). Several measures have been taken by the government as well as ayurvedic private sector to improve the research standards and to develop documented evidence for safety and efficacy of Ayurvedic preparation which meet international standards and expectations. The initiatives include formulating new clinical trials, development of new research methodologies, launching of new research journals, training programs for researchers, development of comprehensive research databases and so on (Manohar, 2010). The major Indian pharmaceutical companies, namely Himalaya, Zandu, Dabur, Hamdard, Maharishi, etc, have already began researches for standardizing their herbal Formulations by Chromatography techniques like TLC/ HPTLC finger printing, etc (Borris, 1996). Evidence-based researches and approaches has now resulted in wider acceptance of ayurvedic medicines (Chopra, 2000).

Lack of adequate regulation of herbal medicines

For the incorporation of traditional medicinal system like Ayurveda into international health care system, needs qualified practitioners and practices. There should be adequate allocation of traditional medicinal systems for capacity building and resource development. This can be achieved by politicization of traditional medicine agenda. Low proportions of Patents from Traditional medicinal systems are due to stringent clauses of Indian Patents Act 1970 (Ganguli, 2004). Proper legal framework should be developed to protect Intellectual Property Rights of traditional knowledge (WHO, 2002). China has achieved international regulatory standard through their national policy. Government of India has framed a policy for Indian Systems of medicine, through Department of Ayush. Government of India also established National Commission on Farmers in collaboration with Foundation for

Revitalization of Local Health Traditions (FRLHT) to exploit benefits of Traditional medicinal system for the local farmer communities (Swaminathan, 2005). India has long way run to achieve its own position in the international arena. Indian government should confer more attention for developing health care policies and regulations for Traditional medicinal systems like Ayurveda (Gerard Bodeker, 2002).

Lack of appropriate research methodology

World Health Organization (WHO) has formulated international guidelines for standard clinical research (Levine and Gorvitz, 2000). Public health research methodologies are inadequate to evaluate ayurvedic formulations. New methodologies should be developed for evaluating ayurvedic formulations. Special consideration should be given for cultural, theoretical and biological aspects of the system. Randomized clinical trial employed for conventional medicines has been found to be less effective in case of traditional medicines (Patwardhan, 2005). Designing clinical trial strategies for traditional systems should also have adequate consideration (Gerard Bodeker, 2002). Traditional medicinal systems should develop a broad base of quality research with strong scientific background.

Research in Ayurveda

Researches in Ayurveda are mainly done in two aspects. One is identification of new drugs from Ayurvedic formulations. The ethnomedical knowledge has led to great developments in healthcare. The most recent development in the field of plant-derived drugs was probably seen in the area antitumor activity, where taxol, vinblastine, vincristine and camptothecin have proved their effectiveness in chemotherapy against some of the deadliest cancers (Ilya Raskin et al., 2002). It will be safer to identify active principles from plants used in traditional systems like Ayurveda than from plants with no use in human history (Daniel S Fabricant, 2001). Second type of research in Ayurveda is arisen from present situation prevailing in the global market. For the global acceptance of the ayurvedic formulation, researches like standardization and quality control of drugs by correlating with international standards, identification of active ingredient and their efficacy studies and toxicological studies are of paramount importance.

Drug discovery

Drug discovery from traditional medicinal systems is one of the emerging fields of scientific research. It follows a "reverse pharmacology path" (Bhushan Patwardhan and Mukund Chorghade, 2004). Holistic approach and well established literature accounts make Ayurveda a promising bioprospecting tool for new drug discovery (Bhushan Patwardhan, 2009). Modern approaches like Combinatorial chemistry can be used for screening active principle of herbal drugs (Verdine, 1996). Many promising molecules came out of ayurvedic drugs including curcumines for inflammation, Holarrhena alkaloids for amoebiasis, phyllanthins as antivirals and many (Bhushan Patwardhan, 2009). Better understanding of traditional knowledge can pay way for more promising medical leads. Pharmaceutical companies should put more innovative efforts for discovering new drugs from traditional medicinal systems (Seidl, 2002). Combination of traditional knowledge such as Ayurveda and creative and innovative modern technologies are needed

for new botanical drug discovery and manufacturing botanical drugs.

Standardization of Ayurvedic drugs

There is enormous scope for traditional medicinal systems like Ayurveda in the global herbal market. For conquering the global market, ayurvedic formulations should be standardized as per WHO guidelines. Standardization involves evaluation of quality, safety and efficacy of the formulations. For the standardization of quality of Ayurvedic drugs, the active principle and their composition should be identified with analytical techniques. Standardized drugs should contain consistent levels of specified compounds, and they are subjected to rigorous quality controls during all phases of the growing, harvesting, and manufacturing processes (Bandaranayake, 2006). According to standardization guidelines, macroscopic and microscopic evaluation and chemoprofiling using HPLC, GC and HPLTC as been recommended (Dnyaneshwar Warude, 2005). Standardization of ayurvedic drugs may lead to the development of monographs and pharmacopeias. After knowing the active principle, it should undergo safety studies both invitro and invivo (Kamboj, 2000). For ensuring safety and efficacy of Ayurvedic formulations, pharmacological and clinical studies should be done. Ayurvedic drugs are generally considered as safe drugs but several adverse side effects have been reported. This brings into focus the need for pharmacovigilance study of Ayurvedic formulations. Even though pharmacovigilance research in ayurvedic drugs is an unthought-of concept, but it is need of the hour (Urmila Thatte, 2011). System biology is a new effective approach for standardization of drugs from traditional medicines (Pulok K Kukherjee and Ponnusankar, 2011). Standardized drugs in market will enhance safety and trust level in people, which in turn enhance the global market of ayurvedic drugs (Gurib Fakim, 2005).

Publications

Even though Ayurveda is one oldest traditional medical system practiced through out the world, it has been selectively neglected in western literature. It can be clearly ruled out the negligible mentioning of Ayurveda in most of the leading journals like JAMA, BMJ and Lancet (Catherine Zollman, 1999). Most pathetic situation emerged when many reputed scientists of medical field are unaware about Ayurveda and its relevance (Paul, 2001). Several high impact journals have denied Ayurvedic articles without any peer review based academic reasons. Now situation is gradually changing, more publications related to quality, safety and efficacy of Ayurvedic medicines in international peer-reviewed journals (Bhushan Patwardhan, 2003). High impact works along with motivated scientists are essential for enhanced international publication in Ayurveda (Bhushan Patwardhan, 2009).

Conclusion

Even though India has a rich traditional knowledge and heritage, its share in the international market is very negligible. There is a growing demand for traditional medicinal system in the present global market. In order to compete with global traditional medicine market, India should lay more stress on standardization and quality proofing of its drugs. Development of the

Ayurveda and other traditional Indian systems of Medicine may help to tap the traditional ethnopharmacological knowledge through modern approaches. Concept of golden triangle consisting of Ayurveda, modern medicine and science will converge for the development of novel, safer, and effective therapies. It won't be exaggeration if we say; there will be Herbal Revolution by India in the global medicine market. India has to take up the challenge of leading the drug and herbal market, and come out as a global leader in the herbal medicine with inventing and patenting of its treasury and conserving its rich heritage.

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