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Ayurveda Medicine Roles in Healthcare Medicine, and Ayurveda towards Ayurinformatics

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Abstract

Ayurveda, the traditional Indian medicines remains the most ancient medicine; it introduces itself as a 5000-year-old science. Many Ayurvedists are proud to be a part of this age-old science. Ayurveda offers a systematic methodology to take care of the different relationships at different levels based on Doshas and use them to design therapeutic protocols and customize them. ‘Doshas’ represent a major difference in the perspective of understanding the human body based on functions than the currently used one in modern biology. Ayurveda needs to be restructured globally to meet the rising demands of a cyber mobile society with the application of information and communication technology. This paper discusses the history of evolution of Ayurveda the advances in information and communication technologies. The most needed things in this digital age is for an intellectual fusion of Ayurveda, biomedicine and information technology which results in Ayurinformatics. It includes contemporary techniques to produce sophisticated models that can assist in drug discovery, automation herb identification and maintenance of e-health records.

Keywords: Ayurveda, Doshas, Ayurinformatics, E-Health care, Drug discovery, Ayurvedists, Medicine, Tridosha, Ayurvedic-Medicare.

I.INTRODUCTION

The Oldest Science of Life We are all aware of the scientific theories behind the evolution of Human life on this earth. It is an incredible development, but what is more amazing is the development and evolution of the knowledge and means to preserve human life. Development and growth of such a body of knowledge in India is referred to as Ayurveda, which was synonymous with the growth and evolution of Indian civilization and culture. We can find historical evidence of Ayurveda in the ancient books of wisdom known as the Vedas'. The science of Ayurveda. Ayurveda is the oldest science of life, a system of diet, healing and health maintenance that is deeply spiritual in origin. Ayurveda is believed to have been around for more than 6000 years. Ayurveda is more than just a medical system. It is, in fact, a Science of Life[10].

Ayurveda is a Sanskrit word derived from two words „Ayur’, which means life; and „Veda”, which means knowledge. Ayurveda is a medicinal science that deals with the life cycle of human being and the awareness of his life on the earth and the reason for their existence on earth.

Ayurveda teaches us to understand our body, our particular nature, and our individual mixture of elements at a deep physical, mental and emotional level. With this knowledge, we are able to identify activities, conditions, herbs and foods that either keep us healthy and in balance, or make us ill and throw us out of balance[1].

Eight major divisions of Ayurveda have been described and followed for specialized knowledge. These categories are:

- **Kayachikitsa** : The closest synonym would be internal medicine,
- **Shalya**: General Surgery,
- **Shalakya**: Specialty dealing with head and neck disorders,
- **Kaumar-bhritya**: obstetrics and pediatrics
- **Rasayana**: geriatrics and rejuvenative/reparative medicine
- **Vajikaran**: Sexology and reproductive medicine,
- **Agad-Tantra**: the body of knowledge on poisons, venoms and toxic substances,
- **Bhuta-Vidya**: infectious diseases and mental illness. The fact that such a systemic categorization was established so early speaks of the knowledge and skills being central to the practice of Ayurveda.

The significance of Ayurveda has increased over a period of time as the practitioners of Ayurveda have become professional practitioners and much trusted from the beginning of

20th century and more and more people have started believing in the science of Ayurveda[11].

II. A THEORY OF TRIDOSHA

Prakriti is one of the unique concepts described in Ayurveda. It is determined by each Dosha or a combination of two or all the three[9]. Analysis of Prakriti helps in assessing the predominance of Dosha or Doshas in an individual. Dosha imbalance leads to the development of disease hence better understanding of Prakriti helps in devising an appropriate therapeutic regimen for a particular subject. This function can be performed in an enhanced way by developing a clinical decision support system using Prakriti as a prime tool. This would help a physician in making effective, timely and appropriate decision as and when needed. The study conveniently used some of the consolidated characteristics mentioned in classical Ayurvedic treatise which may be a limiting factor Tridosha .Prakriti is a consequence of the relative proportion of three entities (Tri-Doshas), Vata (V), Pitta (P) and Kapha (K), which are not only genetically determined (Shukra Shonita), but also influenced by environment (Mahabhuta Vikara), maternal diet and lifestyle (Matur Ahara Vihara), and age of the transmitting parents (Kala -Garbhashaya) [12].

In an individual, the Tri-Doshas work in conjunction and maintain homeostasis throughout the lifetime starting from fertilization. Distinct properties and functions have been ascribed to each Dosha. For instance, Vata contributes to manifestation of shape, cell division, signaling, movement, excretion of wastes, cognition and also regulates the activities of Kapha and Pitta. Kapha is responsible for anabolism, growth and maintenance of structure, storage and stability. Pitta is primarily responsible for metabolism, thermo-regulation, energy homeostasis, pigmentation, vision, and host surveillance[16].

If protein enzymes are inherited, then metabolic pathways requiring several enzymes are inherited. So are patterns of regulation requiring cyclic biochemical pathways for their implementation. From this, and the new understanding of tridosha, it follows that in all species, the precise ways tridosha is implemented must be inherited. There must be a genomic basis for tridosha, and all the individual differences in the expression of each, the personal prakriti (and this must also be true of the 15 subdoshas).

III. EXISTING AYURVEDA SYSTEMS

A. EXISTING EXPERT SYSTEMS

There are many computer based Ayurveda practices designed to assist Ayurvedic doctors to detect, communicate and interpret data for accurate diagnosis. The major decision support systems and expert systems are summarized below.

AyuSoft

This interactive software has been developed in collaboration with C-DAC, Pune; Interdisciplinary School of Health Sciences and Department of Ayurveda, University of Pune; Jnana Prabodhini, NGO, Pune, India. It is a pioneering multidimensional effort for Indian traditional medical system that provides end-to-end medical solutions based on traditional medicines and helps in making health decisions that are expected to be more informed, more accurate and quicker. The target end user for this software may include hospitals, practitioners and researchers. It has wide range of applications including disease diagnostics and treatment, diet and life style advice, personal management information system, multimedia based encyclopedia, and textual and analytical report tool[1].

EasyAYURVEDA:

This has been developed by VHCA herbals which portray an excellent blend of Ayurveda and Information Technology. Suppose a researcher is interested in herbs with sheeta virya (Potency) from the ancient texts of Ayurveda, the process may be so tedious and slow that output of the exercise shall fade away with the passage of time. But software like EasyAYURVEDA can make the process relatively easier and faster. EasyAYURVEDA is a Easy to use Ayurvedic software; contains database of more than 500 Medicinal Plants formulations; helps in advanced searching of herbs & formulations and herb's name in all Indian languages; Multiple string searching & single string searching, Indications on the basis both Ayurveda & modern diagnostic principles and terminologies[6].

BODY TUNE: (Computerized Ayurvedic Medicare/CAM):

This software has been developed by Dr.M.A Shajahan in 1983 in Govt. College of Indian Medicine, Bangalore in collaboration with Indian Institute of Science, Bangalore which was proved clinically successful by Gujarat Ayurveda University. A newer version of the software was developed in collaboration with Cyberveda Technologies in 1988. This particular software neither replaces a doctor nor avoids the importance of doctor-patient relationship. It helps organize diagnostic methods in a classical way envisaged by Indian sages of Ayurveda. This user friendly interactive software promotes accurate diagnosis in a faster and organized way[7].

PRAKES: This is one of the innovative software developed by Resource Center for Indian Language Technology Solutions- Malayalam, Center for Development of Advanced Computing, Thiruvananthapuram, Kerala, India in 1987 and is available in both English and Malayalam version. It is an interactive menu driven interface. It helps in examining the Lakshanas (Symptomatology) and assessing the dominance of Tridoshas (Three Humors). Advices on preventive promotive health care services depending on humeral dominance. The

system records the interactions and results along with the bio-data for future references. It helps generate the hard copy of these recordings[1][6].

PRAKRTI: This innovative and expert software has been designed and developed by Chaitanya Consultancy, Pune in 1989. It renders services on different functionalities of Ayurveda such as Prakrati (Constitution), dietary advices, advices on daily regimens, likelihood of an illness and its precautionary measures[7].

PILEX: As the name indicates, this particular software deals with entirety of piles. It is intended for the diagnosis, prognosis, complications and treatments of piles. It was designed and developed by Gujarat Ayurveda University, Jamnagar, Gujarat in 1990[6].

RASEX: This innovative software was designed and developed by Government Ayurveda College, Trivandrum in collaboration with CIRA (Center for Information Research and Action), and C-DAC (Center for Development of Advanced Computing), Thiruvananthapuram in 1992. This package attempts to correlate the pharmacological properties with that of therapeutic properties with the help of computer. A database was created after collecting, organizing and storing all the pharmacological and therapeutic properties of single rasa drug using DBase III plus. A list of drugs, which conforms to the physician's specifications is collected and displayed in this package[7].

B.ELECTRONIC WEB RESOURCES FOR RESEARCH IN AYURVEDA

1. TKDL DATABASE

Traditional Knowledge Digital Library (TKDL) is a knowledge repository of Indian traditional knowledge related to medicinal, ethno-botanical plants and various concoctions of different formulations used in Indian systems of medicine. Council of Scientific and Industrial Research (CSIR) started TKDL project in 2001, as a collaborative effort with Department of Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homoeopathy (Dept. of AYUSH), Ministry of Health & Family Welfare, Government of India. The objective of the TKDL is to protect the ancient and traditional knowledge of the country from exploitation through bio-piracy and undue patenting. TKDL is a collection of 148 books (transcriptions) on Ayurveda, Yoga and Naturopathy, Unani, Siddha and Yoga. All these works are available in public domain as the part of our traditional knowledge. TKDL, thus, is a database, capable of retrieval of text and its translation of ancient scripture into selected languages[5],[17].

2. Some of the useful websites and journals which contains huge information about ayurveda and its practices are listed in table 1 and table2.

Table 1 : list of websites related to Ayurveda

Name of the website			
www.ncbi.nlm.nih.gov	www.ovid.com	/www.dharaonline.org	www.ayurvedicdietsolutions.com
www.nccih.nih.gov/	www.ayurvedictalk.com	www.ccras.nic.in	www.ayurvedic-healings.com
www.nlm.in/	www.ayurveda-herbs.com	www.ayurved-int.com/	www.ayurveda-herbal-remedy.com
www.ayurdoctor.com	www.indiadiets.com	www.biovatica.com/	www.healthcarehouse.com
www.ayurvediccure.com	www.ayurvedacollege.net	www.ayurveda.com/	www.ayurvedatraditions.com
www.amfoundation.org/ayurveda.htm	www.indianhealthzone.com	www.wholehealthnow.com	www.ayurvedaways.com

Table 2:List of Journals available for Ayurveda related publications:

International Journal of Ayurveda and Pharma Research (IJAPR)	http://www.ijapr.in/
Journal of Translational Medicine	http://www.translational-medicine.com
Global Journal of Research on Medicinal Plants & Indigenous Medicine (GJRMI)	http://gjrm.com/
Journal of Ayurveda and Integrative Medicine	http://ijam.co.in
E Ayurvedic Journal	http://bjournals.ub.rug.nl/ejim
International Journal of Ayurveda and Research	http://www.ijaronline.com
AYU	http://www.ayujournal.org/
Asian Journal of Modern and Ayurvedic Medical Science	http://ajmams.com/
Central Council For Research In Ayurvedic Sciences	http://www.ccras.nic.in/publication/Periodicals
AYU, Institute For Post Graduate Teaching and Research In Ayurveda, Gujarat Ayurvedic University, Jamnagar	http://www.ayurveduniversity.com
BMC Complementary and Alternative Medicine	http://www.biomedcentral.com
Journal of Evidence-Based Complementary and Alternative Medicine	http://chp.sagepub.com
Evidence-Based Complementary and Alternative Medicine	http://www.hindawi.com/journals/ecam

IV.OPPORTUNITIES AND FUTURE WORKS

As more genomes have been sequenced and gene functions elucidated, time has come to bring the valuable ancient medicinal knowledge to the rapidly expanding genomic landscapes. Bioinformatics represents a new, growing area of science that uses computational approaches to answer biological questions. Hence, synthesis of Ayurveda and Bioinformatics with inputs from modern system of medicine is most important in the current scenario[4]. Ayur-informatics is a science dealing with the application of bioinformatics to the Ayurveda medication to provide a scientific platform to the traditional Indian medications. It is the application of information technology in the study of Ayurvedic research, medicine and patient care[11].

Again there are areas which could be explored and worked out for better access, operation and above all better utility of Traditional Indian medicine[4]. This can lead to the development of some work in the following domains of Traditional Indian Medicine. These may include;

- Computer Based Medical Information Retrieval
- Telemedicine, Tele-monitoring, Tele-diagnostics Including Tele-consultation
- Computers In Clinical Laboratory
- Computer Assisted Medical Decision Making
- Hospital Information System
- Clinical Information System
- Networking Rural Clinics with Major Medical Facilities, Links for emergency and consultant services and Multi-media networks for endoscopy.
- Distributed Electronic Medical Records(Computerized patient records ,Computerized prescriptions for patients ,Computer Assisted Patient Education and Health care information)
- Computer-Aided Learning in the Medical Curriculum, Visualization Technology for Visualizing the Human Anatomy
- Networks for linking hospitals, clinics, medical schools, universities, researchers and healthcare providers to share data via Geographic Information Systems (GIS), Remote Information Services and Decision Support Tools for Patient Care
- Tele-presence Surgery and Tele-presence Workstations in Medical Education

V.CONCLUSION

In this paper we have discussed the history and importance of traditional Indian medicine Ayurveda and integration of information and communication technologies with Ayurveda. We had discussed and provided with various existing resources and expert systems in Ayurveda. We also discussed research opportunities for developing innovative technological solutions related to Ayurveda. We understand Ayurveda medicine importance and needs in the global context, to meet the rising needs of a cyber society. Therefore Modern Ayurveda practitioners need to be aware of Ayurinformatics to keep pace with the modern system of medicine.

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