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Contribution of India in Medical Sciences

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The art of tending to the sick is as old as the humanity itself. The ancient civilizations probably knew about the functions, physiology and anatomy of the human body in surprising details, and their art of tending the sick remains a proof of their knowledge. The Hippocratic Oath-which is still taken (though significantly modified) by doctors up to today- was compiled in Greece in the 5th century BC. Along with the Greeks, the Chinese, the Babylonians and Egyptians were practicing medical traditions since time immoral.

India, with its rich cultural heritage, has been in the forefront in contributing the medical science, and there is plenty of proof of the same. Indian medical tradition goes back to Vedic times. During that period, the Ashwinikumars- who were practitioners of medicine- were given a divine status. We also have a God of Medicine called Dhanvantari. Although very few ancient texts are available today, this method of healing was systematized in early times. The fact that the term Veda was attached to this body of thought testifies to this. The art of healing was considered a sacred one, and was spread among sages, hermits and medicos who roamed from place to place. Vaidyas, who generally belonged to Brahmin caste, were those who practiced solely this art.

Although there is no record as to when the plants and herbs started being used for medical purposes (herbalism), the use of plants, clays and soils are pretty ancient. Over time through emulation of the behavior of fauna a medicinal knowledge base developed and passed between generations.

One of the first Indian text dealing with medicine is Atharvaveda.[1] The Atharvaveda also contain prescriptions of herbs for various ailments. Subsequently, the use of herbs to treat ailments, in a much broader way, later formed a large part of Ayurveda[2].

Ayurveda-"complete knowledge for long life"- is one of the earliest medical system known to human civilization. Charaksamhita and Sushrutasamhita, the two main texts of Ayurveda, are surprisingly alike the textbooks of modern medicine.

Charaka, in his compendium Charaksamhita, highlighted that life may be prolonged by human effort. The statement "A physician who fails to enter the body of a patient with the lamp of knowledge and understanding can never treat diseases. He should first study all the factors, including environment, which influence a patient's disease, and then prescribe treatment. It is more important to prevent the occurrence of disease than to seek a cure" highlights the fact that Charaka was more in favour of preventive medicine than the curative ones.[3]

Sushrutasamhita (commonly dated 6th Century BC) on the other hand, involves more on the therapy. Sushruta, one of the first to study human anatomy, described in details about various anatomical structures in his compendium. Also Shashtrakarma, the art of surgery, was recognized as an important part of therapy in this compendium. In Sushrutasamhita, surgery was described under eight heads Chedya (excision), Lekhya (scarification), Vedhya (puncturing), Esya (exploration), Ahrya (extraction), Vsraya (evacuation) and Sivya (suturing).[4] Shusruta's forte was rhinoplasty (plastic surgery) and ophthalmialogy (ejection of cataracts).

Few researchers proposes that that the first mention of leprosy is described in Sushruta Samhita.[5] However, The Oxford Illustrated Companion to Medicine holds that the mention of leprosy, as well as ritualistic cures for it, were described in the Atharvaveda, written before the Sushruta Samhita.[6]

SIDDHA MEDICINE

Siddha Medicine (Tamil Citta- or Tamil-maruttuvam) is a system of traditional medicine originating in ancient Tamilakam in South India.[7] It was traditionally thought that siddhars- who were considered to be in possession of eight supernatural powers-laid the foundation to this system of medications. Agastya is considered to be the 1st siddhar. Siddhars were of the concept that a healthy soul can only be developed through a healthy body, and so, they tried to develop a healthy body first. The drugs used by the Siddhars were either thavaram (herbal product), or thadhu (inorganic substances), or jangamam (animal products).[8]

UNANI MEDICINE

It is a form of medicine which was practiced in Mughal India and in Muslim culture in South Asia. It is actually a form of traditional PersoArabic medicine. This medicine enjoyed royal patronage during the Mughal period, which helped in its spread to different parts of India.[9]

In this system of medicine, any cause and or factor is countered by QuwwateMudabbiraeBadan (the power of body responsible to maintain health), the failing of which may lead to quantitatively or qualitatively derangement of the normal equilibrium of akhlat (humors) of body which constitute the tissues and organs. Subsequently, regional

therapy (IlajBilTadbeerwaIlajBilGhiza), pharmacotherapy (IlajBilAdvia) or surgery (IlajBilYad) were used to treat the subjects as needed.

YOGA

Yoga is a system of exercises for physical and mental nourishment. The tradition of Yoga is a hoary one and has been kept alive by ascetics and hermits. The therapeutic qualities of yoga had special relevance for hermits who roamed from place to place, meditating. But Yoga is not only physical postures. The main aim of yoga is to achieve calm state of mind. It is essentially based on mind and body relationship aiming complete 'homeostasis' between the two, which can be attained through eight steps- namely Yama (moral behavior), Niyama (healthy habits), Asana (physical postures), Prayanama (breathing exercises), Pratyahara (sense withdrawal), Dharna (concentration), Dhyana (contemplation) and Samadhi (higher consciousness). The principles of yoga are Proper Relaxation, Proper Exercise, Proper breathing, Proper diet and Positive thinking and meditation.

Modern medicine

The evolution of modern medicine in India is blurred. There has been many scientists, researchers and physicians who have constantly tried to upgrade the knowledge of medicine and science of healing the sick. A few of them are mentioned below:

UPENDRANATH BRAHMACHARI (1873-1946)

UN Brahmachari was born in 1873 in Jamalpur, Bihar, where his father Nilmony Brahmachari was a doctor with the East Indian Railway. He started out to become a mathematician, and passed his BA in mathematics in 1893. Then he completed masters in Chemistry, before he joined Calcutta Medical College to obtain Licentiate in Medicine and Surgery degree in 1899. Subsequently, he worked with single minded determination in a small ill equipped room in the Campbell Hospital (presently NRS Medical College) to discover a new drug to cure Kalaazar. After 5 years of toiling, Urea Stibamine was discovered, which quickly became essential for the treatment of Kalaazar.[10]

RAMNATH CHOPRA (1882-1973)

Ram Nath Chopra was born on August 17, 1882 at Gujranwala, Punjab. He had his early education at Jammu and Srinagar and collegiate studies at Government College, Lahore. After studying in England, he returned India to be the first professor of pharmacology in the newly established Calcutta School of Tropical Medicine in 1921. In his tenure, he conducted various studies on general pharmacology and pharmacotherapy, alongwith surveys on drug addiction. Professor Chopra was the 1st to establish a centre of study and research in pharmacology in India, at the Calcutta School of Tropical Medicine. His work encouraged research on Indian medicinal plants at different institutions. Certain indigenous substances like ispaghula, kurchi, rauwol, psoralea, cobra venom, etc. were included in Indian Pharmocopia by him. The books by Chopra and associates entitled "Indigenous Drugs of India", "Glossary of Medicinal Plants of India" and "Poisonous Plants of India" had been popular encyclopedia of Indian medicinal plants.[11]

YELLAPRAGADA SUBBAROW (1895-1948)

SubbaRow can best be described as an unfortunate scientist who did not get his due recognition. Born in 1895, he worked at Harvard Medical School until 1940, when he went to Lederle Laboratories for research. His research led to the discovery of Polymyxin, an agent used even today. Aureomycin, the first of tetracycline, was also discovered by him. Fiske-SubbaRow method of colorimetric estimation of organic, inorganic and lopoid phosphorous in blood and urine has been one of the 100 most cited papers. Also, the discovery of folic acid, aminopterin and anti-pernicious factor (Vitamin B^{12}) is credited to him. Methotrexate, the derivative of aminopterin, is still being used in various conditions.[12]

SUBHASH MUKHOPADHYAY (1931-1981)

A physician from Calcutta, Dr. Mukhopadhyay was the first one to create India's first test tube baby in 1978, but never got due recognition of the same. Unfortunately, all the bureaucratic interventions and false accusations were too much for this eminent researcher. Finally, tired of being targeted for no reason whatsoever, he decided to take his own life in 198. [13]

RONALD ROSS (1857-1932)

Sir Ronald Ross was born in Almora, India in 1857 to Sir C.C.G. Ross who was a general in the Indian army. In 1892 he became interested in malaria and on 20 August 1897, in Secunderabad, Ross made his landmark discovery. While dissecting the stomach tissue of an anopheline mosquito fed four days previously on a malarious patient, he found the malaria parasite and went on to prove the role of Anopheles mosquitoes in the transmission of malaria parasites in humans. By July 1898, he had demonstrated that mosquitoes could serve as intermediate hosts for bird malaria. After feeding mosquitoes on infected birds, he found that the malaria parasites could develop in the mosquitoes and migrate to the insects› salivary glands, allowing the mosquitoes to infect other birds during subsequent blood meals. Located on the Northern wall of the Presidency General (PG) Hospital, lies a arch shaped memorial dedicated to Ronald Ross, Nobel Prize winner of Medicine in 1902. Sadly, very few people from Kolkata are aware of this memorial.[14,15]

HARGOVIND KHORANA (1922-2011)

Born in Raipur, Punjab, he completed his MSc and went to the University of Liverpool for his PhD degree. At the age of 46, Hargovind Khorana shared the Nobel Prize for Physiology and Medicine in 1968 with Robert W Holley and Marshall W. Nierenberg for contributions towards elucidating the genetic code. In 1972, at the Massachusetts Institute of Technology, Hargovind's team described a monumental achievement in chemical biology- the total chemical synthesis of a functional tRNA gene of yeast. Khorana's methods of extension of DNA polymers into synthetic gene, using polymerase and ligase enzymes

that link pieces of DNA together as well as methods that anticipated the invention of PCR, are widely used in biology laboratories for sequencing, cloning and engineering new organisms.[16]

DWARKANATH KOTNIS

An Indian doctor from Solapur, Dr Kotnis gave up a bright career to join five other doctors to serve the sick and war driven in China during the Sino-Japanese war of 1938. He was affected by the mysterious disease which was affecting the Chinese soldiers and for which he was trying to find a cure, and he died in 1942.[17]

After these eminent scientists, there was a long period of void when the contribution of India to the medical science became negligible. New researches and newer molecules were out of sight then. But recently, newer drugs and Indian research molecules like Saroglitazaar for Diabetes[18] and Arterolane Maleate and Piperaquine Phosphate (Synriam) for treatment of Malaria are showing rays of hope. Also, the biosimilar drugs being manufactured are probably the cheapest in India. The cheap price of the drugs, alongwith modern medical facilities being developed, is rapidly converting India into a favorite spot for medical tourism.

Unfortunately, India had also contributed something which is not so good. The rampant sale of over the counter medications without any control is definitely not something to be proud of. Also, the indiscriminate use of antibiotics has resulted in India being the forefront in producing resistant bugs. The New Delhi metallo-beta-lactamase 1 (NDM-1) enzyme, which makes a bacteria resistant to carbapenems, was first found in a Swedish patient treated in India. Although later the editor of Lancet apologized the naming, still it is well known that there is every possibility that some resistant strains are contribution of India.[18]

India has a rich cultural heritage, a strong social base and an impressive history. Her contributions to medical science over ages cannot be underestimated. But today, we seem to have lost our zeal to contribute. Very few medical students are going for a full-fledged research, and very few contributions are made to the medical science. Let us try to rectify it, and try to contribute something for the sick. Only then can claim to be true descendants of Charaka and Sushruta.

KEY WORDS

Ayurveda, Charaka, Sushruta, Ronald Ross, Polymyxin

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