Chapter - 1

Introduction
Medicine must have originated the same time, as diseases is co-existent with life itself. With the law of jungle prevailing there was undoubtedly the survival of the fittest and therefore, man must have been always concerned about his health. Having thus originated with man himself it is long before any recorded history when history began to be written in the different centres of civilization, medicine was already to some extent developed. These records are much earlier than the discovery of paper and appear one clay tablets, engravings in stone, writing on papyrus in Egypt and on birch bark and palm leaves in India. Some other feature of medical drugs of those days are discovered from archaeological finds examination of well preserved mummies also show the types of illnesses as well as what was done for them.

In his earliest days as men could not explain the existence of disease, therefore, there was all the emphasis on the supernatural. Thus in all the centres of first habitation of man, medicine grew up around the belief that the world swarmed with evil spirits which plague the living creature with disease. Sickness was always associated with the evil eye, casting of a spell, the curse, or some form of black magic.

Appropriate measures had to be taken to drive out demon or evil spirit or propitiated the Gods. Medicine, therefore, remain the property of Magic Man, sorcerer and the priest for very long time. This persisted through every civilization to a very late day naming only in degree according to the scientific development in the different regions. Such practices were frequent up to the middle age.

There was the well known witch's cauldron. Its brew made from snakes, herbs etc. was alleged to cure anything from a barren womb to a girls' lack of suitrosl. The sorcerer was also a familiar sight with his prescriptions. The witch Doctors have been the subject of much comment and more credit is being given to them now than previously. There cures are now being put to "faith-healing", and "auto-suggestions" and they are even credited as being psychoanalysts long before the names of freud, Alder and Jung.

Practically every one all over the world has some sort of superstition though it may vary in degree between the more educated and scientific people compared to the others not so advanced.

For example, there is the Mania charm wore in New Zealand. This has originated from the
Maoris

More interesting is the glass ball shaped like an eye being sold in the bazaars of Turkey meant to avert the evil eye. A most interesting superstition to which every physician, knowingly or unknowingly, subscribes even to this day is the use of the letter "Rx" before he puts down his prescription. The manner of his writing has its origin from a very ancient Egyptian charm meant to avert the evil eye and is derived from the symbol of the eye of Horus, the Hawk-Headed Sun god, which was one of the deities involved by Egyptians physicians when administering to their patients.

ORGANISED MEDICINE

Organised medicine had its origins in the four most ancient civilizations that developed along the river valleys of Indus and ganges (India), Nile (Egypt), Euphrates and Tigris (Sumaria Mesopotamia - Babylon) and china. To this may be added the region of Peru.

INDIA

"Thou shall renounce all evil desires, anger, greed, passion, pride, egotism, envy, harshness, meanness untrue indolence and other quantities that bring infamy upon oneself."

-Sushruta (6th cent BC.)

Extract from oath of initiation

It is to consider Indian Medicine first not only for reasons of patriotism but because of its great antiquity. Also because not much is known about it in the west.

Prof. Keshwani an authority on the subjects writes: "The west, until the close of the eighteen century remained ignorant of the achievements of the ancient Hindus in art, science and culture, inspite of the ample testimony of the latter's early achievements found in the work of the ancient Greek historians and scientists, who have all along been credited by the western historians with the origins of all the arts and sciences that are cherished by the modern civilization. Solon (? 638-558 BC.), Pythagorus (? 580-498 B.C.), Herodotus (484-425 B.C.), Plato (428-348 B.C.) and philostratus (3rd century BC.) have all acknowledged that even the ancient Egyptians to whom the Greeks were to a great extent indebted for their own culture and civilization, " obtained much of their
knowledge from some mysterious nation of the east, " (wise, 1845), count Bjornstferna (1844) in his book. "The theogony of the Hindus" remarks " what has been briefly stated here may be sufficient to show that no nation on earth can raise with the Hindus in respect to the antiquity of their civilization", Old documents from northwest masopotamis, show that the Mitanian kings worshipped the vedic gods as early as 1600 BC. Hermann schelenz (1904) in his geschite der pharmazie concludes that "the Indians are one of the oldest civilised people on earth. Apparently it was they who kindled the light of science for the world". The vedas have been considered as the earliest known literature in the world.

The Indo-Gangetic civilization made remarkable progress in all sciences the atomic theory was propounded in 500 B.C. Advances in chemistry were unparalleled. The major contribution of India to science was in the field of medicine.

THE ORIGIN OF AYURVEDA-

The origins of medicine in every civilization have been in the realm of mythology, so also in India. It is believed that originated from the God Bramha also held as the God of creation or in other words the creative aspect of divinity. Another mythological tale is the churning of the ocean with a view to extract from their Amrit kumbha or the elixir of life. It is symbolized as an attempt to discover the secret of life and living and to find remedies to save civilization from material, mental and spiritual crisis and chaos that engulf man in every age. By this great churning, there arose from the ocean a youth eternal.

Dhanwantari, the divine physician and God of Ayurveda, the Indian Science of Medicine. He is supposed to have taught sushruta and the mystries of Ayurveda.

The probable period when medicine, as a rational systematised science was introduced in the Indo-Gangetic plains may have been between the fourth and the third millennium BC. (Dwarkanath), About this time there are references among other to surgical feats said to have been performed by ashvins, the twin brothers, who are held as celestial physicians. There is mention of the restoration of a severed head; the substitution of the human head with that of the horse and the restoration later of original head; the giving of a newdentrure; the removal of the diseased eyes and its replacement with a new eye and replacing the broken leg of a lady, Vishpala, with an artificial iron leg. This is
indication of a very well developed science of metallurgy in addition to surgery. For medicine, Ashvins are also stated to have cured paralysis, consumption and rejuvenated the aging.

Skulls of the third millennium BC. reveals signs of successful cranial surgery.

The time bracket from 3500 BC. or earlier to about the third century A.D. is the era of progressive evaluation of medicine in India.

Towards the end of this period came the phase of the arrest, stagnation and later decline of rational medicine sociopolitical changes undoubtedly had their hand in bringing this about. Available evidence points to the fact by about the fifth century a well developed and highly systematised art and applied medical science comprising of eight distinct and well defined specialities, existed:

1. Internal medicine- Kayachikitsa
2. Paediatrics-Balachikitsa/kau mara bhritya
3. Psychological medicine- grahachikitsa
4. Oto-Rhino-Laryngology & opthamology Urdhwangchikitsa/Shalakyatantra
5. Surgery- both general and Shalayachikitsa/tantra
6. Toxicology- Damshtachikitsa/Agadatantra
7. Geriatrics-Jarachikitsa/Rasayantantra
8. Sexology-Viischyachikitra/vajikarantantra.

There are mentioned in the compendium of charaka (2nd cent A.D.) Chakra is the most famous name in Indian Medicine as Sushruta is for surgery. There was (a) promotive preservative and preventive medicine and (b) curative medicine Charaka gave to the new entrants in medicine the following famous oath.

"Not for self, not for the fulfilment, of any earthly desire of gain but solely for the good of suffering humanity should you treat your patients and so all. Those who sell the treatment of diseases as merchandise gather the dust neglect the gold..."

Sushruta (6th cent. B.C.) is probably the best known among early physicians and surgeons. Almost all important operations are mentioned by him. For the detection of the 1120 diseases that he enumerated, sushruta recommended diagnosis by inspection, palpation and osculation. Recognized as the father of Plastic- Surgery. Sushruta performed 15 varieties of plastic surgery on the ear
alone. He, however, confined plastic surgery to human face. He devised a method for grafting a new nose. It was his technique of "Indian Nose" that was used for the first rhinoplasty operation by carpe in London in 1814, thus giving birth to Plastic surgery in the West. He also carried out operations on intestines and eyes. A total of 121 surgical instruments are mentioned by him which include the present day scissors, scalps, forceps, needles, syringes, rectal and vaginal speculums, catheters etc.'

Sushruta used wine, henbane and cannabis indica for anaesthesia. Ancient Indian Medical knowledge was based on human direction and is proved by allusions found in writings of both Sushruta and Charaka. This is atleast 2000 years earlier than anywhere else in the world. Sushruta has mentioned about allergy, 1500 years before Rhazes.

Jivaka is another famous physician and surgeon of 6th cent. B.C. He was a physician of lord Buddhas (c 560- c 480 B.C.). He performed successful cranial surgery on king Bimbisara. Another time this king had a painful bleeding fistula. This was cured by a single application of medicine.

Will durant mentions following remarkable things about Indian Medicine:

"Anticipating weismann by 2400 years Atreya (6th cent. B.C.) held that the parental seed is independent of the parents' body and contains in itself in miniature, the whole parental organism"

"Birth control in the latest the theological fashion (the rhythm method) was suggested by the Hindu Medical schools of 500 B.C.

Bhava Mishra (1550 A.D). where voluminous work on anatomy. Physiology and medicine mentioned a hundred years before Harvey, the Circulation of blood and prescribed mercury for that novel disease, syphilis, which had recently been brought in by the Portuguese from Europe.

Vaccination unknown to Europe before the eighteenth century was known in India as early as 550 A.D. if we may judge from a test attributed to Dhanvantari, one of the earliest Hindu Physicians: "Take the fluid of the pock on the udder of the cow upon the point of a lancet, and the lance with it the arms between the shoulders and elbow, until the blood appears, then mixing the fluid with the blood the fever of small pox will be produced".
Anaesthesia-

A Cranial operation on king Bhoja (1010-1056 A.D.) for brain tumour in recorded, What is of special interest is the fact that this was performed under anaesthesia induced by a drug "Sammohini" (800 year before its discovery in the west) and a drug "Sanjivini" was used to revive the patient to consciousness, Medical Science today has yet to discover such a drug.

Durant mentions- Taking of the pulse was described in a treatise dating to 1300 A.D. Urine analysis was a favourite method of diagnosis, with-this some physicians were able to cure any patient without having seen anything more of him than his water.

Medical education was carried out at a number of Universities out of which Varanasi, Takshila and Nalanda may be especially mentioned. These were established earlier than 600 B.C. Jivaka, Physician of Lord Buddha, graduated from Takshila after 7 year's course, This University was active for a long time till its destruction by the Huns, Nalanda continued to flourish till destruction by Bakthiari Khilji in 10th Century A.D. with the destruction of Nalanda, medical education as an institutionalised discipline came to an end.

To the Indian universities students came from far off lands like china, Tibet, Java, Sumatra, Korea, Greece, Iran and Arabia.

In the 8th century A.D. services of Indian doctors like Manaka and others were requisitioned by the great Caliph Harun-al-Rashid of Baghdad when he was seriously ill and Arab Physicians had lost all hopes of curing him.

GREECE

Greece has been the cradle of civilization in the West and great has been its contribution to medicine. Being comparatively more recent history much is known about it.

Like in Indian Medicine, beginning of medicine in Greece also appear in the realm of mythology and like wise of direct descent from the Gods.

APPOLO, a son of Zeus, the greatest of all Gods, is the Greek God of Medicine. After him the mantle falls of his son, Aesculapius, who was trained by the centaur, chiron. Pandoras has its
origin in the same period of mythological, Aesculpius had two daughters Hygna, the Godess of health concerned with preventive medicine and panacea being gifted to cure everything and so a byword for universal remedy. First mention of Aesculpius is in the Hometic poem, the mino, His two sons Machaon and Podealirius served as physicians in the historic size of Troy about 1180 B.C. The practice of medicine in Greece may be considered to be the cult of Aesculapius. He was raised to the level of God or demi-God. Temples were created to him as earlier to Imhotep in Egypt and in these Aesculapius. As they are called patients prayed and slept and supposedly got cured in their sleep or at times received instructions from Aesculapius in their dream vision.

The advent of Hippocrates (460-361 B.C.) marked the beginning of the real departure from the ancient aracha medicine and of the dawn of the scientific era in medicine in Greece. He along with Socrates, Plato and , Aristotle embarked on the quest of knowledge and succeeded in breaking the barrier of ignorance. Superstition, witchcraft, spell and charms. One of the outstanding contribution of Hippocrates that brought him to glory was that he studied patients and not diseases, thus foreshadowing "individualization", a feature special to Homoeopathy. He founded the logical method of "clinical observation". He emphasised the role of external environment, on the characteristics of man, in health and diseases. His humeral concept as embodied in the treatise on "Air, Waters and places." was studied in medical schools for nearly twenty centuries. It was his great wisdom that he considered diseases to be a deviation from the normal states, and not an entity.

Like Ayurvedic physicians he has mentioned both the laws of similars (similia) as also the law of Dissimilar (contraria). For similar, he writes, "A different way (for therapy) is thus: the disease is produced by influences which act similar to the effects of the remedy and the diseases condition is removed through remedies which produce similar symptoms to the disease. Also in certain cases a feverish state can be cured by influences identical with those that had provoked it..........

The similia has been amplified as, "By similar things disease is produced and by similar things administrated to sick these are healed of their diseases. Thus the same thing which will produce strangury, when it does not exist, will, remove it when it does, in the same way, a cough can be provoked and cured by the same medicine. Thus he also perceived that in the application of similia a smaller dose is required.
Until the middle ages Hippocrates was the Father of medicine at least among Westerners, as Imhotep was among Egyptians, Hwangti among Chinese and Sushruta among Indians.

Theophrastus (?300 B.C.) the first pharmacognosist recognised the flower as a metamorphosed leaf twenty centuries before Goethe. He is considered the 'Father of botany', but his contribution to medicine is only indirect.

ROME

In Rome Galen (130-200 A.D.) repeated the work of Hippocrates and systematized existing medical knowledge, which had become jumbled and disorganised by philosophic speculations during the 600 years that had passed after Hippocrates. He urged for a return to the Hippocratic tradition of direct observation at the bedside, tested by anatomical and physiological experiments. His observation that arteries carried blood was one of the classical contributions. In time his theories acquired the state of dogma.

His purpose was to organize medicine so rigidly that his work would suffice for all times. In therapy he was great apostle of the contraria principle and he makes no mention of the similia of Hippocrates. He will also be remembered for his complex prescriptions compounded by mechanical means.

Ayurveda for a Healthy & Disease Free Society:

The word Ayurveda, is made up of two components, 'Ayush' meaning life and 'Veda' meaning science, hence Ayurveda is science of life'. The origin of this ancient science dates back to the Vedic period about 5000 years ago. Brahma, the creator was the originator of this system, who passed it on to the Ashwini Kumars (physicians of God) and who in turn imparted it to the Rishis (the saints) from where it was promoted among the people through generations.

The main objective of Ayurveda is maintenance and promotion of positive health and cure diseases, through medicines, dietary restrictions and regulated life style.
Health is a state of physical, mental and social well being and not merely a state free from diseases, Ayurveda, too has defined as equilibrium of the three biological units (Doshas) and body tissues (Dhatus) and a state of pleasure of the soul, senses and the mind. These states will certainly lead to social, and spiritual well being of an individual. This is very much in conformity with the above definition of health as stated by WHO. Hence the importance of Ayurvedic treatment is relevant in modern times as well.

In today's fast competitive world there has been a revolution in our eating habits and lifestyle. We are exposed to various types of stress and strain which tell upon health. Even our diet has become more synthetic than the natural one which exposes us to the toxius, resulting in various disorders. Even the modern curative agent are synthetic, Therefore in addition to having specific therapeutic action they also create adverse reactions in the human body, while curing one disease, they might be the cause for another with the growing awareness of the dangers and limitations of the allopathic system of treatment the answer now is Ayurveda. The majority of Ayurveda medicines are free from toxic effects of synthetic preparations. Again in Ayurvedic medicines will combination of several ingredients the side effects are expected to be neutralised or the desired effects enhanced.

Decoctions, pills etc. of Indian Medicine are compound preparation/formations revealing properties difficult to be explained in the wake of modern pharmacology. The benefits derived from these preparations can not be overloaded. The actions of the drugs were known to our ancestors thousands of years back, which were based on observations, inferences, discussions with each other and of course their administration of human beings.

A few examples to explain the action of same drugs in the wake of modern pharmacology can also be elicited.

(A) Vasaka (Adhatoda Vasica an ingredient of vasa) was used by the Ayurvedists in cough, cold, bronchitis etc. to promote expectoration and its antitussive and antiallergic action has been explained on the basis of the alkloid vaccine.

(B) Kutaja (Halarrhena anti dysenterica, an ingredient of Kutajarishta) has been recommended as a good remedy for dysentery and this action of it has been explained because of alkaloids cohesive, which is an anti - amoelsic.
(C) Bael (Aegle Marmelose, an ingredient of Gangadhar Churna) with its mucilage and tannin content is recommended as an ant diarrhoeal.

On the basis of these one can easily conclude that if single alkaloid extracted from the plant could prove its action in a particular ailment, without previous chemical or laboratory investigation, then certainly on the basis of the Ayurvedists to explain the action is worth mentioning. Such examples are many therefore its recommendation as an effective alternative to modern medicine especially in chronic and non-life threatening conditions would prove fruitful and beneficial to the society at large.

**Introduction - The systems of medicine**

**AYURVEDA:**

Human life and knowledge of pressuring it as a going concern, in the face of overpowering and brute physical and biological environment, must have come into being almost simultaneously. It has to be so. There can not be any other plausible explanation, other than this, to account for the continuity of human race and survival and its several highly developed cultures and civilization. All known cultures of the past-Egyptian, Babilonian, Jewish, Greek, Indus-valley etc. have their own equally glorious and useful systems of medicine and health care.

In India, development and growth of such a body of knowledge known as ayurveda meaning science of life, was coeval with the growth and evaluation of Indian civilization and culture. Vedas which has considered to be the repositories of recorded Indian culture have mention of this knowledge both in the theoretical and practical form. There is discussion of theories about the composition of living and non-living matter, the physical, biochemical, biological, psychological and spiritual components of man and the vital motive forces working both inside and outside the body. In other ancient works there is mention of such current medical subjects like anatomy, psychology, aetiology, pathology treatment and environmental factors. This medical knowledge has been the work of ages. It is the outcome of the great power of observation, generalization and analysis combined with patient labour of hundred of investigators spread over thousand of years.
Ayurveda means the science of life. Around 1500 BC, Ayurveda's fundamentals and applied principles got organised and enunciated. Atharva Veda (one of the four most ancient books of Indian knowledge, wisdom and culture) contains 114 hymns or formulations for the treatment of diseases. In this sense Ayurveda is considered to have divine origin representing one of the oldest organized system of medicine for positive health and cure of human sickness. Making use of systematic, careful observation and documenting detailed experience over the past several thousand of years, it has grown into a very comprehensive health care system with two major schools and eight specialisation. It has a School of Physicians and a School of Surgeons referred in literature as 'Atreya Sampradaya' and "Dhanvantari Sampradayas" respectively.

The most important and massive ancient compilation of the School of Medicine is known as 'Charaka Samhita'. It contains several chapters dealing at length therapeutic or internal. About 600 drugs of plant, animal and mineral origin are described in it. Besides, this compendium also deals with other branches of Ayurveda like anatomy, physiology, aetiology, prognosis pathology, treatment and medicine etc.

An equally exhaustive ancient compilation, 'Sushruta Samhita', exists relating to school of surgery. It deals primarily by with various fundamental principles and theory of surgery. More than 100 kinds of surgical instruments including scalpels, scissors, forceps, specula etc. are described along with their use in this valuable document. Dissection and operative procedures are explained making use of vegetables and dead animals. Descriptions of how to go about doing incision, excision, extraction and bandaging etc. are detailed in this compendium. In addition, this document also mentions of such other topics as anatomy, embroyology, toxicology and therapeutics. It also has a mention of about 650 drugs.

In course of time Ayurveda, which started as a magico-religious practice, natured into a fully developed medical science with eight branches which have parallels in the modern western system of medicine. The growth of these eight specialities gave Ayurveda another name of Ashtanga Ayurveda.

The medical knowledge was divided into the following eight branches:-

1. Internal Medicine - Ayachikitsa
2. Paediatrics - Kaumarabhritya
The Classical works of Ayurveda describes it as under:

It is that knowledge of life which deals elaborately and at length with conditions beneficial or otherwise to the humanity and to factors conducive to the happiness or responsible for misery or sorrow besides indicating measures for healthful living for full span of life.

Ayurveda is also considered as 'Science of Life'. This probably makes it the earliest medical science having positive concept of health to be achieved through a blending of physical, mental, social, moral and spiritual welfare.

Health according to Ayurveda is balanced (inter - intra ) state of all the Dhoshas and Malas. Healthy person enjoys equilibrium of the humorous, the body tissues and excretory functions normally experienced by man in the process of gratifying his senses, mind and soul. Ayurveda deals with the total human being comprising of "Tridoshas", "Dhatus" and "Malas" and the relation of his totality with the outside world or the universe.

For promotive and positive aspects of health, Ayurveda has worked out detailed daily and sessional pattern of life activity. It emphasises regulated diet, sex and sleep.

Present status of Ayurveda in India:

Ayurveda is the oldest medical system of the world and is based on vast experience over thousands of years. One of most ancient book "Atharvaveda" contains many hymns or formulation for treatment of diseases since then the Ayurveda is based on the knowledge of systematic and careful observation documenting detailed experience over the several thousand of years.
Preventive and curative aspects of diseases are considered as important components of the concept of positive health. There are four key concepts in Ayurveda:

1. Panchmahabhutas  
2. Tridoshas
3. Dhatus  
4. Malas

After independence, the Government of India first constituted 'Ayurveda' pharmacopoeia committee in 1962 with a view to maintain the uniform standards in preparation of drugs and to prescribe working standards for compound formulations including tests for identifying purity and quality of the drugs.

Pharmacopoeia Laboratory for Indian medicines at Ghaziabad U.P. established as a standards setting cum-drug testing laboratory for Indian medicines including Ayurvedas, Unani and Siddha system at national level. Similarly central council of Indian medicine was established for laying down and maintaining uniform standards of education in the field of Ayurveda, siddha and unani and regulating practices in these fields under the existing provisions.

At national level a model institute namely National Institute of Ayurveda was established in 1976 at Jaipur (Raj) in collaboration with the Govt. of Rajasthan as an apex institution of research in the field of Ayurveda. Besides this central council for research in the field of Ayurveda and siddha was constituted in 1978 with a view to initiate, aid, guide, develop and coordinate scientific research in different aspects fundamental and applied Ayurvedic and Siddha system of Medicine. During 1978, Indian medicines pharmaceutical corporation Ltd., was incorporated with a view to meet the demand of units under central and state governments.

**SIDDHA:**

Siddha is one of the ancient medical systems of the world. It was founded by saints (Maharishi) who were highly talented scientists and who perfectly understand the human mind and body during health and illness from embryonic life to death. The founders who were known as Siddhas, lived in various parts of India, in general and southern India in particular, specially Tamil Nadu. The system of medicine developed within Dravidian culture which is of the pre-vedic period. The siddha system is largely therapeutic in nature.

The medical literature of Siddha which are mostly in the form of cudjan leaves in Tamil
language and scientifically and systematically codified into various subjects starting from paediatrics to geriatrics including the intermediary subjects like ophthalmology, gynaecology etc.

This system also deals with the concept of salvation in this life. The exponents of this system consider achievement of this state is possible by medicines and meditation.

Present Status of Siddha:

Govt. of India has set up a pharmacopoeia committee for siddha system of medicine for preparing official formularies/pharmacopoeia with a view to maintain uniform standard in preparation of drugs and to prescribe working standard for compound formulations including test for identifying purity and quality of the drugs. Central council for Indian Medicine constituted under IMCC act 1970 regulates the education of siddha system and central council for research in Ayurveda & siddha was established in 1978 with a view to initiate, undertake and regulate the research work in siddha system of medicine also.

NATUROPATHY-

Naturopathy is not mainly the system of treatment but a way of life. It is often referred to as drugless treatment of disease. It is based mainly on the ancient practice of the application of the simple laws of Nature. The system is closely allied to Ayurveda so far as fundamental principle are concerned. These are two schools of thought regarding the approach of Naturopathy. One group believes in the ancient Indian methods while the other mainly adopts western method which are more akin to modern physiotherapy.

The advocates of Naturopathy pay particular attention to eating and living habits, adoption of purificatory measure, use of hydrotherapy, cold packs, mud packs, baths, massage and a variety of methods/measures based on their innovative talent.

A carefully supervised total fast or partial fast is Advocated to clear the system of toxic build up, Water and / or dilute fruit juices are permitted. The Naturopath has to keep a strict supervision lest the patient may develop physical and emotional untoward effects. The system believes that the way of life, if properly organized and if one does not retaliate, one can get the bounties of energy, health and happiness form the benevolent nature. What one is to do for prevention of
disease, promotion of health and to get therapeutic advantages is to adopt means natural to nature with no heroic measures of treatment or retaliation or distortion of nature.

YOGA:

The system of yoga is also as old as Ayurveda. It was about 2500 years back when Patanjali propounded it in a systematic form, which consists of eight components namely restraints, observance of austerity, physical postures, breathing exercises, restraining of sense organs. Contemplation, meditation and Samadhi. These steps in the practice of Yoga have potential in improvement of social behaviour, personal behaviour, improvement of physical health, improvement of better circulation of oxygenated blood in body, restraining the sense organs and thereby the mind and in inducing the tranquillity and serenity in the mind. The practice of integrated type of yoga prevents psychosomatic disorders/diseases and improves individual resistance and ability to endure stressful situations. Meditation, one of the eight components mentioned earlier, if regularly practised has the capacity to reduce unwholesome bodily responses to a bare minimum so that the mind can be directed to perform more fruitful functions.

A number of physical postures are described in yogic words to improve bodily health, to prevent diseases and to cure illness. The physical postures are to be chosen judiciously and are to be practised in a right way to derive the benefits of prevention of diseases, promotion of health and for therapeutic purposes. Breathing exercises helps in supply of proper oxygenated blood in the body. Studies have revealed that the yogic practices improves the intelligence and memory and help in developing resistance to endure situation of strain and stress also to develop and integrated psychosomatic personality. Meditation is yet another exercise which can stabilise emotional changes and prevent abnormal functions of vital organs of the body. Studies have shown that meditation not only restrains the sense organs but also controls the autonomic nervous system.

Present status of Naturopathy and Yoga:

The National Health policy recognises the role of Naturopathy and Yoga for promotion of health and prevention of diseases. Central council for research in yoga and naturopathy was established in 1978 with a view to initiate, aid, develop and coordinate scientific research in different aspects of yoga and Naturopathy and to promote and assists institutions of research for the study of
diseases, their prevention, causation and remedy in the field of Yoga and naturopathy. The Central Research Institute for yoga was established during 1976 with a view to conduct research for the study of diseases. The National Institute of Naturopathy, Pune has been registered as an autonomous body during 1984 under the Ministry of Health and Family Welfare.

AMCHI SYSTEM OF MEDICINE

The Amchi system of medicine is also known as the Tibetan system of medicine and is in vogue in Ladakh district (Jammu & Kashmir)/ Lahual (Himachal Pradesh, Arunachal pradesh, Sikkim and some regions of Himalayas). The system traces its origin to Ayurvedic system of India. The medical system since its delivery by Lord Buddha, while meditating near Bodhgaya in course of time, had accumulated a huge literature and Amachi's of great fame and repute were produced. Therapy under the system is divided into treatment by herbs, minerals animal organs, spring and mineral water, moxibustion and by mysticism and spiritual powers.

The Tibetan system is patronised by his Highness the Dalai Lama. The Tibetan Medical Institute at dharamshala, Himachal Pradesh was established by H.H. Dalai Lama in 1961 with a pharmacy, Tibetan Medical college, 10 bedded hospital, museum of drugs, surgical instruments tests and medical and astrological paintings besides wings for literacy Research, Astrology and Astronomy. There are 14 dispensaries in India.

The central council for research in Ayurveda and siddha under the Ministry of health and family welfare, is having a Amchi research unit to carry out clinical research and to conduct survey of local drug potentials.

UNANI:

Origin & Development

Unani system of medicine originated in Greece (460 B.C.- 377 B.C.) It was further enriched and developed by Arabs and Persians. Unan is the Arabic name Greece which denotes the origin of the system. Hippocrates established his philosophy of health on the word 'Physi' which meant simply Oranism and he postulated that life comprised a reciprocal relationship between organism and environment. He explained that disease was a normal process and its symptoms were the reaction of the body to the diseases. The chief function of the physician was to aid the natural forces of the body.
He held that there exist in the body 4 humorous that keep up the balance of it. He also laid emphasis on diet and a few drugs for cure of diseases.

A galaxy on Unani medical luminaries have come to the forefront after Hippocrates, Aristotle, Herophilus, Erasistras, Ibn Sina, Diasmordes, Galen, Almamun Ibn Masawahg, Rhazes Ibn Ishaq al, Ibn Al Baitar etc. all have contributed a lot to this system of medicine.

Aristotle's Study on anatomy and embryology. Galen's on the value of anatomy and experimental physiology. Ibn Masawayhs book on dietetics drugs, fever, Venesection cupping, stomach disorders, catarrh diarrhoea, colic animals and alchemy and Avicennan's Medical book 'Canon' are the bright examples of the development of Unani system of medicine. The most esteemed of Rhazes medical works Al-Hawi was an encyclopedia of medicine and surgery. He had written some most important books, like al-kitabul mansuri and Treatise on smallpox and measles.

Apart from the above, one of the most renowned physicians of all the time was Ibn Sina (980-1037 A.D.) a men eminent as physician, philosopher, scientist, statesman and poet who has kept this system of medicine alive for all times to come.

Unani System in India:

Unani system of medicine was introduced in India about a thousand years back. Due to long Muslim rule for centuries, the unani medicine was also fully established during this period. Ayurvedic physicians had started using many unani drugs in their practice. In addition to Ahiphena (papaver somniferum linn) and bhanga (cannabis sativa linn) etc. of medieval period, the use of formulations containing sankhiya (arsenic) kucala (strychnos nux vomica linn) Tamakhu (Nicotana tobacco) and Soraka (Potassium Nitrate, salt petre) etc. was increased during this period.

A number of new modes of preparations like Sarbat, Gulkand and malham from unani medicine and acids from Allopathy were also taken in Ayurveda as included in Siddhabhesaja manimala of this period. Attempts were also made to assimilate new thoughts into Ayurveda such as Daktarimatanusara mutrapariksa (urine examination according to modern medicine).

Pre-Mughal and Mughal period:

From the court physicians Note Books, it is known that the almost all rulers of sultanate
period were practising Unani system of medicine for the welfare of the people during Alauddin Khilji's period (1296-1316), Hakim Sadruddin Damisqi (master physician) occupied a high rank and after him Hamid Motaraz who was famous for his diagnosis by feeling pulse and examining urine. The system existed during the reign of sultan Altamish also. Hakim Zia Mohammed was the court physician of Mohammed Bin Tughalaq.

The famous books Tibb-e-shahabi, Kafaya Mujahidiya and Ma-dan-ush-shifa sikander were published during the pre-mugal period.

During the Mughal period, Unani medicine was practised extensively. Hakim Ali Geelani, Hakim Ananullah khan, Mirza Muhammed were the court physician of Akbar, Jahangir and Mohammed shah respectively. The famous books Ummul Ilaj, Mizanut Tibb, Qurabadeen-e-Qadari, Shaah-e-Geelani was published during the Mughal period unani medicine was popular during Mughal period among the masses as well as the rulers.

British period

Although the British looked down upon the Unani Medicine, the Nawabs of some States patronised this system of them Nizam of Rampur, Nawab to Tonk, Maharaja of Patiala deserve to be mentioned. Also some Hakim's of Delhi Lucknow and Hyderabad took concentrated measure to stop the tide of decay and decline of Unani system during this period. Sharifi family of Delhi and Azizi family of Luknow are worth mentioning on whose efforts Unani system of medicine survived in the British period.

FUNDAMENTAL PRINCIPLES

The Unani system of medicine is based on the Humoural theory which presupposes the presence of four humours namely blood (Dam), Phlegm (Balgham), Yellow bile (Safra), and Black bile (Sanda) in the body. The temperament of persons are expressed accordingly by the words sanguine, phlegmatic, choleric and Melancholic according to the preponderance of them in the body. Everybody has got a unique humoural constitution which represent the healthy state of humoural balance of the body. The Unani medicine plays a vital role when the individual experiences humoural imbalance. The correct diet and digestion can bring back the humoural balance. Its main emphasis on diagnosis of a disease through Nabz (Pulse), Baraz (stool) etc. It has laid down six essential pre-requisites for the prevention of diseases. These essentials known as 'Asbab-
e-sitta Zarooriya' are air, drink food, bodily movement and response, sleep and wakefulness and excretion and retention.

There are various types of treatment in Unani system of medicine. These are-

1. Ilaj-bil-Tadbeer (regimental therapy)
2. Ilaj bil-Ghiza (dieto therapy)
3. Ilaj bil-Dawa (pharmaco therapy)
4. Jaharat (surgery)

The regimental therapy includes venesection, cupping, sweating, diversis, turkish bath, massage, metastatic, cauterisation, purging, vomiting, exercise and bleeding etc.

Dieto therapy aims at treating certain ailments by administration of specific diets whereas pharmaco therapy deals with the use of naturally occurring drugs mostly harebells. Though drugs of animals and mineral origin and Surgery have been in use in this system for quite long. In Unani medicine both single drugs and compound drugs are employed in the treatment of various complex and chronic disorders now-a days.

Diagnosis and Treatment:

The Unani system of diagnosis of disease and treatment, restoring health, revolve round the concept of temperament of 'Mizaz'. The humours also have specific temperament. Changes in temperament is related to changes in the balance of humours. Any change in temperament brings about a change in the health of the individual. Thus the imbalance of the harmony of humours and temperament along with failure of one or more parts of the body to eliminate pathogenetic waste causes diseases. The diagnosis may involve.

1. Measuring of body heat by feeling of pulse palpitation and use of thermometer.
2. Urine examination for ascertaining functioning of kidney, liver and digestive system.
3. Examination of Stool.
4. Close observation of condition of eyes, lips, teeth, throat and tonsils.
5. Emotional and mental status of the patient is also taken note of, as indicative of certain imbalance in the functioning of human body.

After complete examination of the patient, treatment is started. Treatment is mainly done
through drugs which also have identified and specific temperament (Hot, Cold, Moist, dry etc. in
different degrees). Use of drugs restores balance of humours by activising self preservation mecha-
nism of the body. The system believes in the presence of some natural self preservation mecha-
nism in human body.

The drugs are supposed to stimulate and strengthen the action of this defence mechanism. In other
words, drugs not only normalise the existing imbalance but also improves the natural defence
mechanism of the body so as prevent or minimise chances of future disease. Thus the treatment
generally is both curative and preventive in nature and effective. The Unani system recognises
inoculation and immunization preventive measures against diseases Regulation of disease consti-
tute an important part of treatment.

ADVENT OF UNANI MEDICINE IN INDIA

The Govt. of India constituted a unani Pharmacopoeia Committee consisting of Unani ex-
erts and Scientists of other sciences to prepare an official formulary and Pharmacopoeia of
Unani drugs. The first part of National formulary of Unani Medicine (English Version) Contain-
ing 441 compound formulations has already been published and the work on Second part of it is in
progress along with zoo newly drafted and compiled compound Unani Formulations for its third
part (English Version). The Govt. of India has set up National Institutes of Unani Medicine at
Banglore in collaboration with the state Govt. of karnataka in 1975 in order to serve as a model of
teaching, training and research in the country. The Central Council for Research in Unani Medi-
cia (CC RUM) was established in 1979 in order to initiate, aid, conduct, develop and Coordinate
the scientific research of Unani Medicine, but the research studies in Unani medicine were first
perceived and started by Masihulmulk Hakim Ajmal khan in 1920, much before in setting up of CC
RUM in 1979.

HOMOEOPATHY

Definition: "Homoeopathy is a system of treatment of diseases by drugs usually prescribed
in minute doses, that in a healthy person would reduce symptoms like those of disease"

Origin: The Homoeopathic way of healing was devised by the great German physician
Dr. Christian fredrick Samuel Hannemann in the late 10th century. He came across an old idea of
the efficacy of "cinchona bark" in treating intermittent fever due to its tonic effect on the stomach and conducted experiments upon himself in order to get the truth. He deduced from the experiment that cinchona is used as a remedy for intermittent fever in healthy people.

The law of similia "Similia Similibus curentur" or "let likes be treated by likes" thus forms the basis of treatment under the homoeopathic system of medicine. Homoeopathy is a specialised method of drug therapy employed to cure the natural sufferings of a person by the administration of drugs which have been experimentally proved to poseurs power of producing similar artificial suffering or symptoms of diseases in healthy human being.

Basic Concept:

Homoeopathy is the youngest medical science and it has been in the service of mankind for almost two centuries. Its main emphasis is on the remedial agents in illness and in health. It is a low cost system using only non-toxic drugs, The price of Homoeopathic medicine is almost negligible while the benefits to human health are commendable. Even in this short period of time it has established a reputation for successful treatment of chronic illness.

Dr. Samuel Hannemann, who is the father of this system of medicine, introduced it for the use of humanity through his scholarly work "Organon of the art of healing" in the year 1810.

Due to various reasons like low-cost and non-toxic nature of its drugs, Homoeopathy is getting in India a very high recognition and acceptance from the people. Having its origin in the modern scientific age it has the benefit of basing its theory and concept on demonstrable scientific principles and procedures.

It is based on four cardinal principles of :-

1. The law of similars.
2. The law of direction of cure
3. The law of single Remedy.
4. The law of minimum Dose.

Among this the most fundamental is the first "Law of similars". This law states that the symptoms experienced by the sick person are not the disease, Symptoms are the reaction of the defence mechanism of the body, which it mobilises in order to counteract the morbific influence, be it a specific stress such as bacteria or viruses or a non-specific stress such as climatic changes,
environmental pollution, mental and emotional disturbances etc. Symptoms are the best possible reaction of the organism under stress. They are the means through which the organism tries to regain its lost balance. In order to help the Organism to achieve this Homoeopathic physician should assist and strengthen there reactions through his drugs rather than suppress them.

The other three laws further refine the above central concept by describing the different phases likely to be experienced in the process of treatment, selection of only one single agent most potent to create in a healthy man the same symptoms as are being experienced by the sick person, and determining the minimum possible dose to be given.

Health & Sickness in Homoeopathy:

This system assumes that any disease symptoms syndrome is the reaction of the defence mechanism of human body against the disease causing agents. The symptoms are the means through which body tries to regain its lost balance. According to it the symptom syndrome in a disease is not the disease per se, but the reaction of the defence mechanism mobilised by the body in order to counteract a morbific influence existing in the body and causing the loss of balance of the healthy body. Thus the disequilibrium in the normal functioning of the organs of body implies sickness.

Diagnosis and Treatment:

The classical approach to the problem is to individualize each person although they may suffering from the same disease. The practitioner has to have detailed and long interviews to find out specific characteristics of the defence mechanism of each sick person. He has to study the patient's mental, physical and emotional conditions. Such an examination alone gives an understanding of the imbalance and associated complex of symptoms of the sick person.

Treatment in Homoeopathy:

In Homoeopathy primary emphasis is on Therapeutics. It takes a holistic approach towards the sick individual and treats his disturbances on the physical, emotional and mental levels at the same time. Its aim is to bring back the lost equilibrium of the sick individual on all the three levels by stimulating and strengthening his body's defence mechanism. The remedy for treatment is chosen on the assumption that the patient is extremely sensitive to it and that this remedy can produce the symptomatology of the sick person. In other words for treatment it believes that let the same
substance which can produce specific symptoms in a healthy individual cure those same symptoms in a sick individual. The prescribed remedy strengthens the body's defence mechanism which in turn re-established order or balance again.

In deciding the treatment the Homoeopathic practitioner follows the well known principles of similia similibus 'curentur'.

In simple terms it means let the same substance which can produce specific symptoms in a healthy individual cure those same symptoms in a sick individual, although the symptoms have arisen from another cause i.e. Bacteria, viruses etc. This cure is based on the assumption that the patient is extremely sensitive to the particular remedy and only to that remedy which can produce his symptomatology.

Similarly, Homoeopathy has definite effective treatment for such diseases as diabetes, arthritis, bronchial asthma, epilepsy, skin eruptions, allergic conditions and mental or emotional disorders.

Advent of Homoeopathy in India

Homoeopathic system of treatment was first introduced in India in 1839 by Dr. J.M. Honigberger. During his visit to India he cured Maharaja Ranjit Singh of Punjab though his native physicians failed to do that
INDIAN PHARMACEUTICAL INDUSTRY

BRIEF HISTORY AND DEVELOPMENT

The foundation of the modern Indian pharmaceutical industry was laid in the beginning of the current century when, in 1901, a small factory known as the Bengal chemical and pharmaceutical works, was established in Calcutta. Through the two world wars game a fillip to the development of the industry the progress made under the British rule was insignificant. The country dependent largely on the United Kingdom, France, Germany for its requirements of drugs and medicines.

Since the achievement of independence in 1947, the Indian leaders have lent their energies to economic development of the country. Well thought out five year plans are being formulated to rise the standard of life of the Indian people. Already eight such plans have been implemented with appreciable success. The development of Indian Drugs and Pharmaceutical Industry was not commensurate with the size of this country and the growing needs of her population when India embarked on her planned economic expansion about 40 years ago. Since then the progress of this industry has been substantial and many sided with the result that it has become one of the country's leading industries. India is now producing a larger quantity of varied pharmaceutical products.

In 1948 the sale of pharmaceutical products amounted to just Rs. 10 crores by 1954 the figure has risen to Rs. 54 crores and by 1960 to Rs. 70 crores. The figure stored as between Rs. 85 and 90 crores in 1961 and in 1968 as much as Rs. 175 crores worth of pharmaceutical were produced. The total turnover of formulations has increased from Rs. 1200 crores in 1980-81 is about Rs. 6000 crores in 1992-93.

In implementing the five year plans, India pursued a course of mixed economy. Fullest opportunity is offered to entrepreneurs to start new concerns and industrialisation already in the field are given liberal loans to expand their factories, industries too big and complex to run successfully by individual capitalist firms of groups of firms became the responsibility of the state. Thus in every field of production industry is divided into a private and public sector. The capital investment has risen in the pharmaceutical industry from Rs. 24 crores in 1952 to more than Rs.

Having embarked on a vast programme of industrialization the Indian government was at once confronted with a host of problems, the foremost among them being non-availability of foreign exchange for purchasing capital goods abroad and lack of suitably trained personal and many basic raw materials. The pharmaceutical profession, so vital to the growth and development of the industry was almost non-existent.

<table>
<thead>
<tr>
<th>Investment</th>
<th>(Rs. Crores)</th>
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</thead>
<tbody>
<tr>
<td>1965</td>
<td>140</td>
</tr>
<tr>
<td>1973</td>
<td>225</td>
</tr>
<tr>
<td>1977</td>
<td>450</td>
</tr>
<tr>
<td>1979</td>
<td>500</td>
</tr>
<tr>
<td>1982</td>
<td>600</td>
</tr>
<tr>
<td>1985</td>
<td>650</td>
</tr>
</tbody>
</table>

To meet the needs of foreign exchange and to encourage indigenous production the Govt. imposed heavy restriction on imports of foreign goods including drugs and raw materials. But as many of them were not produced in the country, it created scarcity on a considerable scale. In view of the pressing demands for all sides the policy was revised from time to time and licences granted to import certain drugs. The restrictions, however continued on import of non-essential patent and proprietary medicines for which suitable substitutes manufactured indigenously were available.

Drug Industry: Growth Indicators

<table>
<thead>
<tr>
<th></th>
<th>1965-66</th>
<th>1992-93</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital Investment</td>
<td>140</td>
<td>1000</td>
</tr>
<tr>
<td>Productions:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formulations</td>
<td>150</td>
<td>6000</td>
</tr>
<tr>
<td>Bulk Drugs</td>
<td>18</td>
<td>1150</td>
</tr>
<tr>
<td>Import</td>
<td>8.20</td>
<td>1000</td>
</tr>
<tr>
<td>Export</td>
<td>3.05</td>
<td>1281</td>
</tr>
<tr>
<td>R &amp; D Expenditure</td>
<td>3.00</td>
<td>70</td>
</tr>
</tbody>
</table>
Prior to the launching of the second plan, the second plan, the manufacturer of pharmaceuticals was limited largely to processing of bulk imported drugs in to tablets, capsules and other formulations. Indian firms under agreement with foreign firms were making injectable, powders, ointments and liquids and producing patent and proprietary medicines. Certain units were producing biological products like liver extracts, vaccines and sera. Alkaloids like quinine, strychnine, caffeine and morphine were also being extracted. It was however obvious that the country could not forever be dependent on foreign manufactures for both finished drugs and basic raw materials. With the changing political climate, pharmaceutical manufacturers in India were encouraged to take up the manufacture of basic drugs, wherever it was economically possible and technically feasible. A system of collaboration was instituted under which Indian manufacturers in association with established firms in the U.S.A., Switzerland, West Germany, Italy and the U.K. began to produce a fairly comprehensive range of basic items.

Forty-six years ago it was not sufficiently realised that basic chemicals and pharmaceuticals are two different industries the latter depends by and large on the former for its growth, Unfortunately, in India while the pharmacological industry had grown, the chemical industry lagged behind; indeed it is in its infancy, but is non progressing at a fast rate.

Synthetic drug industry demands a sound foundation of basic petro-chemical industry and a well established dyestuff industry is a great advantage if not absolutely vital. Such foundation was already present in the industrially advanced countries of Europe and U.S.A. and hence the growth of synthetic drug industry was rapid. However, conditions in India were different in that the industrial development in the general field was held to be more or less parallel and its this has made it necessary for the synthetic drugs industry to depend on imported intermediates and raw materials in the initial stages of development. However, during recent years the country has well advanced in the production of basic chemicals and with all the heavy organic projects planned for execution the drug industry is looking forward to finding more and more of its basic raw materials from the indigenous sources, Adequate production capacities have been licenced for many of the raw materials and one can hope that every endeavour will be made to produce most of the necessary raw materials indigenously.
NEEDS DESCRIBED-

Naturally the pharmaceutical industry had to of necessary to import the raw- materials from wherever it was available. The raw materials needed by the pharmaceutical industry can be classified into three groups:-

(a) a botanical origin, (b) of animal origin, and (c) chemicals- organic, Inorganic, synthetic or otherwise. With a few exceptions, raw materials of botanical origin, are available in India in abundance. Some parts of the country such as kashmir and the regions laying at the foot of the long Himalayan ranges as also certain areas in the south, abound in herbs and medicinal plants. India is fortunate in possessing manifold varieties of plants yielding medicinal products and essential oils. Large quantities of nux vomica seeds are collected from forest, of India from alkaloids like strychnine and brucine are extracted. Ipeca is cultivated over large tract on the slopes of Himalayas. Rouwolfia serpentina described in the most ancient texts of medicines, grows in India extensively which is produced in the country and its active principals extracted. Large quantities of dioscorea root all collected from high altitudes of mountain and cultivated in the south and the hormones synthesised in modern factorises. It is from the Indian medicinal plants that such drugs and medicaments as quinine, emetine, strychnine, ephedrine, caffeine, digitalis glycoside, opium alkaloids, codeine, morphine, cocaine, ergot are produced in bulk quantities.

The raw material belonging to the animal origin group too, are available in the country, though confined to the cities and big towns. But owing to restrictions on the slaughter of cattle, we are short of the raw materials for certain biological products for instance, pancreas from which insulin is made is in a short supply and is still imported. Among the biological products we are manufacturing at present sera vaccine, liver extracts-oral and injectable-lecithin and cholesterol on sufficiently large scale.

DIFFICULTIES-CITED-

It is in the chemical and synthetic group of raw materials that the Indian Pharmaceutical manufacturer had to face some difficulties. The chemical raw materials are themselves the
Products manufactured by highly technical chemical industries from whom the pharmaceutical manufactures obtain there requirements.

During the second and third plan period many manufacturing units were set-up throughout India to produce penicillin, streptomycin, chloramphenicol and broad-spectrum antibiotics of the tetracycline group. Several units, mainly in Maharashtra, West Bengal and Gujrat under took the production of synthetic drugs and vitamins. In the first group may be mentioned sulpha drugs, Aspirin, Sulphanes, oral antidiabetics and procaine, in the vitamin range there are vitamins A, B6, B12, C, Nicotine acid and Niacinamide.

Having achieved liberation from foreign domination after a grim and long struggle India was reluctant to secure outside assistance in implementing the economic plans. But the experience gained during the days of first five year plan. Compelled the National Government to re-consider its policy not only with regard to the restriction on the import of essential drugs and raw materials but also about inviting foreign capital and securing the aid of experts and technologists. The revised policy was based on four principles.

1. To lay firm foundation of basic organic chemical industry and a basic inorganic chemical industry so as to cover the entire range of chemicals required by national drug industry.

2. To establish, both in the public and private sectors, manufacturing programmes so far as to: (a) produce in the country basic intermediates of drug industries; and (b) produce all basic and finished stages.

3. To promote suitable technical and financial programmes so that the entire range of drugs and pharmaceuticals in produced indigenously and to establish suitable research programmes in the industry and in the national laboratories.

4. To faithfully utilise the present technical personnel and man power in the service of the industry and to provide an adequate additional basic programme needed for the industry.

This enlightened policy has born good and satisfactory fruit, the major difficulties have been removed and many problems solved. Raw materials were imported; export and technical Know how became increasingly available and above all, foreign industrialists and financiers came forward to collaborate on quite agreeable terms. Most of the pharmaceutical houses which were importing finished products with packing ready for sale started manufacture their drugs either from
material available within the country or from the intermediates which could be imported after obtaining proper licence. Some international pharmaceutical firms joined hands with the Indian producers to manufacture drugs and other pharmaceutical appliances.

While the allocation of foreign exchange for the import of essential raw material and basic intermediates for the production of drugs has been more or less static the value of products manufactured has increased progressively several fold indicating the growing status of the industry and its capacity switching over to basic raw materials and components of indigenous origin.

The production of drugs and pharmaceuticals continued to increase. The production of Bulk Drugs and formulation during 1992-93 is estimated to be of the order of Rs. 1150 crores of Bulk Drugs and Rs. 6000 crores of Formulations.

The production of drugs and pharmaceuticals maintained the growth pattern of the previous years. The following table shows the production of bulk drugs and formulations from 1985-86 to 1993-94.


Production of Bulk Drugs and Formulations:

<table>
<thead>
<tr>
<th>Year</th>
<th>Bulk Drugs (Rs. in Crores)</th>
<th>Formulations (Rs. in crores)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985-86</td>
<td>416.00</td>
<td>1945.00</td>
</tr>
<tr>
<td>1986-87</td>
<td>458.00</td>
<td>2140.00</td>
</tr>
<tr>
<td>1987-88</td>
<td>480.00</td>
<td>2350.00</td>
</tr>
<tr>
<td>1988-89</td>
<td>550.00</td>
<td>3150.00</td>
</tr>
<tr>
<td>1989-90</td>
<td>640.00</td>
<td>3420.00</td>
</tr>
<tr>
<td>1990-91</td>
<td>730.00</td>
<td>3840.00</td>
</tr>
<tr>
<td>1991-92</td>
<td>900.00</td>
<td>4800.00</td>
</tr>
<tr>
<td>1992-93</td>
<td>1150.00</td>
<td>6000.00</td>
</tr>
<tr>
<td>1993-94</td>
<td>1320.00</td>
<td>6900.00</td>
</tr>
<tr>
<td>1994-95</td>
<td>1518.00</td>
<td>7935.00</td>
</tr>
</tbody>
</table>

(Source: Annual Report 1993-94, Ministry of chemical and fertilizers, Dept. of chemicals and petrochemicals, Govt. of India)
Most of the drugs covering a wide range of antibiotics for example penicillin, streptomycin, Tetracycline, chloramphenicol; Erythromycin, semisynthetic penicillin etc. Sulpha drugs, including long acting ones e.g., Sulpha Somidine, Sulphamathoxazole, sulphadimide, phthalyl, sulfathiazole, etc., vitamins e.g. A, B1, B12, C, D,E,P,K and Folic acid etc. are now being manufactured within the country. Efforts are being made to step up the production of Ampicillin and chlorquin phosphate as their production is not sufficient to meet the demand. Production of vitamin B6 has been undertaken in the country.

IMPORT OF TECHNOLOGY

In the field of drugs and pharmaceuticals, foreign collaboration has been approved in respect of a number of drug items. The areas where India requires technology upgradation and infusion of new technology are Betalactum antibiotics, cepnalesporins, Rafimpicin etc. India is also interested in upgrading technologies for antibiotics such as Penicillin and other items like dapsone.

DRUG PRICING -

There are about 500 bulk drugs which are consumed in the Country, out of which about 350 bulk drugs are produced in our country and the rest of Bulk drugs are being imported from other countries. The price of Bulk drugs and formulations are regulated as per the provisions of the DPCO 1987. At present 143 Bulk drugs and their formulations are under price control. The span of price control was reduced under the DPCO 1987 to make it more selective and effective.

During the year 1992, more than 90 revisions/fixation of prices of various controlled drugs took place. The revision/fixation are either based on cost-cum-technical study of BICP or on the escalation formula provided by BICP in this report.

To encourage indigenous research and development in the field of drugs, one of the schemes of the Govt. is to exempt bulk drugs, and formulations based thereupon, from price control in favour of a particular manufacturing unit who has indigenously developed/improved the process to manufacture it from the basic stage.
<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of the Bulk Drugs</th>
<th>Name of the Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ranitidine</td>
<td>M/S Ranbaxy Labs, Ltd.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M/S Globe organics</td>
</tr>
<tr>
<td>2.</td>
<td>Metoclopramide</td>
<td>M/S I PCA Labs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M/S Infar (I) Ltd.</td>
</tr>
<tr>
<td>3.</td>
<td>Dextropropoxyphene</td>
<td>M/S wockhardt Ltd.</td>
</tr>
<tr>
<td>4.</td>
<td>Salbutamol</td>
<td>M/S Cipla Ltd.</td>
</tr>
<tr>
<td>5.</td>
<td>Ephedrine</td>
<td>M/S Malladi Drugs,</td>
</tr>
<tr>
<td>6.</td>
<td>Ranitidine</td>
<td>M/S Globe organics</td>
</tr>
<tr>
<td>7.</td>
<td>Amoxycillin Sodium</td>
<td>M/S Duphar-Interfran Ltd.</td>
</tr>
<tr>
<td>8.</td>
<td>Verapamil HCl</td>
<td>M/S Associated Drugs Co. (P) Ltd.</td>
</tr>
<tr>
<td>9.</td>
<td>Metoclopramide</td>
<td>M/S Infar (I) Ltd.</td>
</tr>
<tr>
<td>10.</td>
<td>Nalidixic acid</td>
<td>M/S Ranbaxy Labs. Ltd.</td>
</tr>
<tr>
<td>11.</td>
<td>Naproxen</td>
<td>M/S Rallis India Ltd.</td>
</tr>
<tr>
<td>12.</td>
<td>Theophyline</td>
<td>M/S Pefco Idus. Ltd.</td>
</tr>
<tr>
<td>14.</td>
<td>Timolol Maleate</td>
<td>M/S FDC Ltd.</td>
</tr>
<tr>
<td>15.</td>
<td>Glipinicide</td>
<td>M/S U.S. Vitamin</td>
</tr>
<tr>
<td>16.</td>
<td>Poridine Iodine</td>
<td>M/S Wockhardt Ltd.</td>
</tr>
</tbody>
</table>

So far the above (table) bulk drugs and their formulations have been granted exemption from price control under DPCO 1987 for a period of 5 years from the date of commencement of their commercial production on the grounds of indigenous Research and Development.

Another incentive scheme to encourage the research and development in the field of drugs and formulations is to grant exemption from the Drugs (Price control) order 1987. In favour of manufacturing unit in respect of its formulations having a New Delivery System developed by the Drug Controller (India). The following formulations have so far been allowed exemption from price control under DPCO 1987 for a period of 3 yers from the date of approval by the Government.
S.No. | Name of the formulation | Name of the Company
--- | --- | ---
1. | Diclonac Sustained Release tablets. | M/S Lupin labs, Ltd. B Bay
2. | Terramycin L/A | Pfizer Ltd. Bombay
4. | Feofol-spansule substained release Tabs. | Eskayef Ltd. Bangalore
5. | Isoptin (calaptin) 240 mg substained release tabs. | Boehringer Mannheim (I) Ltd. Bombay
6. | Theo PA controlled release tabs | Nucron Pharma (Pvt.) Ltd. Pune
7. | Ketoprofen controlled release caps 100 mg. | Themis Pharma Bombay
8. | Premobil S.R. Ibuprofen) 300mg. caps | Biological Ltd. Hyderabad

Helps by foregers

Russians and Americans besides other countries have helped initially in building the Indian pharmaceutical Industry. In September 1958, the soviet union offered India Technical and financial assistance including credit by machinery and equipment for developing the drugs and pharmaceutical industry. A Russian expert team was asked to assist India in filling up the gaps in the production of synthetic drugs and alkaloids from Indian Medicinal plant, hormones and other vital drugs and medicines including the antibiotics. After extensively touring the country and holding discussion with the Indian experts, the soviet team submitted a report in which they recommended setting up of five units involving a total outlay of Rs.36 crores. Nearly one-third of it was proposed to be spent on a plant to manufacture antibiotics. The other unit recommended by the team were for manufacturing synthetic drugs. Vitamins and intermediate chemicals surgical instruments, medical equipment and extraction of endocrines from animal glands.

On the basis of this report following public sector undertakings were established which produced bulk drugs and pharmaceuticals of a sizeable quantity as indicated.

**Drugs And Pharmaceuticals Undertaking In The Public Sector**

1. Indian Drugs and Pharmaceuticals Ltd. Indian Drugs and Pharmaceuticals Limited (IDPL) was incorporated as a company under the companies Act. It has five plants one each located at Rishikesh
for the manufacture of Antibiotics, at Hyderabad for manufacture of synthetic Drugs, at Madras for Surgical Instruments and formulations, at Gurgaon for formulations and at Muzaffarpur for Drugs and chemical Intermediates. It has also three subsidiaries set up in association with state Industrial Development Corporation in Rajasthan, Uttar Pradesh and Orissa.

IDPL produces bulk drugs, formulations, surgical instruments and fine chemicals.

There has been a production and sales of Rs. 178.00 crores and Rs. 164 crores respectively during the year 1992-93 as against Rs. 154.12 crores and Rs. 166.48 crores respectively during the year 1991-92.

The value of production of IDPL during the period April-September, 1993 has been Rs. 82.10 crores as compared to Rs. 5.55 crores during 1991-92.

Rajasthan Drugs & Pharmaceuticals Limited Jaipur -

This project being set up in association RIMDC was approved in August 1978. The production and sales during 1992-93 were of value of Rs. 3.90 crores and Rs. 6.02 crores as compared to Rs. 4.10 crores and Rs. 6.02 crores during 1991-92, respectively.

Orissa Drugs and Chemical Ltd. Bhubaneswar -

This company was incorporated on May 1, 1979 and commissioned in 1983 IDPL holds 51% share in the equity capital of this company. Value of production during 1992-93 was Rs. 1.30 crores as compared to Rs. 0.9 crores during 1991-92.

2. Hindustan Antibiotics Ltd. (HAL), Pune

Hindustan Antibiotics Limited (HAL), pimpri, pune was incorporated on the 30th March 1954. The company is engaged in the manufacture of penicillin and its derivatives, streptomycin, Ampicillin Gentamycin, semi-synthetic penicillin, Vitamin C and formulation.

The plant is producing penicillin with the new strains and technology obtained from M/s. Toyo Jozo, Japan, Glaxo Laboratories U.K. have furnished the technology and strains for improving the production of streptomycin. The production of Gentamicin is based on the technology and know how obtained from Maelimpex, hungry and chimion, Hungry. While Ampicillin is being produce from 6- APA with the technology from American Home product. 6- APA as such is being produced, through on a small scale, from penicillin First crystal based on HAL'S own technology.
Government had approved in 1977 expansion in the capacity of penicillin, Streptomycin and Ampicillin and the expansion has been in June 1979 and Commissioned during October 1979, Streptomycin plant was completed and the Commercial production established. The rated capacity of 180 tonnes is achieved gradually. The Ampicillin plant expansion was completed and commercial production established. The formulation plant expansion was completed and Commissioned in stages. The total estimated cost of expansion of these four plants was Rs. 19.24 crores.

It production during 1991-92 amounted to Rs. 136 crores as compared to Rs.108 crores during the previous year. Sales turnover of the company during April-September, 1993 was Rs. 106.33 crores.

Government has approved the establishment of three joint venture formulation units one each at Maharashtra, Karnataka, and Goa. The total cost of the project of Maharashtra and Karnataka is Rs. 307.89 lakhs each while the formulation plant in Goa involves an outlay of Rs. 210.45 Lakhs. HAL will be holding 58% of the equity capital of Maharashtra and Karnataka Units and 51% in the Goa project. All these projects set up with the Co-operation of State Govt. Corporation.

The company as a result has 3 subsidiaries established in collaboration with the respective State Government and Financial Institution:

1. Maharashtra Antibiotics and Pharmaceuticals Ltd. Nagpur-

During 1992 production and sales of this subsidiary company were to the extent of Rs. 414 Lakhs and Rs. 464 lakhs Respectively.


The project at cost of Rs.280 lakhs is in production.

3. Goa Antibiotics & Pharmaceuticals Ltd., Goa:

The Plant at an estimated cost of Rs. 292.54 Lakhs has been completed in January 1983 and commissioning completed by March 1983.

Smith, Stanistreet Pharmaceuticals Ltd. - Government nationalized the undertaking of Smith, Stanistreet and company Ltd., Calcutta on 1st October 1977 and a new company called Smith, Stanistreet Pharmaceuticals Limited was registered in July 1978. The production and sales have gradually improved.

The scheme for expansion in the manufacture of formulations involving an estimated outlay
of Rs. 109.56 Lakhs in the existing premises of the factory is complete. The company has reduced the losses and is expected to reach a break even point.

4. Bengal Chemical and Pharmaceutical Ltd.

The management of the company was taken over by Govt. under the provision of the Industries (Development and Regulation) Act, 1951 on the 15th Dec. 1977. The Undertaking was nationalized on 15th December 1980.

With four production units at Maniktals, Panihati in west Bengal, Kanpur and Bombay for the manufacture of bulk drugs, formulations, chemicals and cosmetics.

5. Bengal Immunity company Ltd. (BIC)-

The management of BIC was taken over by Government on the 18th May 1978 for a period of 2 yrs. under the provisions of the IDR Act. It was nationalized on 1st October 1984. The company has two Units, one each at Calcutta and Dehradun and is producing sera and vaccines as well as bulk drugs and formulations. The production and sales of this company have also improved.

Govt. have approved the rationalization and modernization of certain facilities in the plant involving an outlay of Rs. 59 Lakhs. The Co. also had plans to manufacture Ampicillin and chloroquin with an increased capacity.

A Project for the manufacture of 80 tonnes of chloroquin Phosphate per annum has been erected, It is expected to go into production soon, Govt. have also approved a project for improving the productivity of Tetanus antitoxin manufacture in Dehra Dun.

The value of production and sales during 1992-93 amounted to Rs. 15.72 crores and Rs. 14.91 crores as compared to Rs. 16.20 crores and 14.89 crores during 1991-92.

PRODUCTION OF PHARMACEUTICALS-

Production of Drugs and Pharmaceuticals increased at a faster rate in 1990-91 than in 1984-85 despite various difficulties faced by the industry particularly by way of substantial increase in the cost of raw materials packing materials etc. and inadequate availability of power and water. The country reached a state of self sufficiency in the essential drugs, Sulphamethaxazole,
Growth of Pharmaceutical Sector has been encouraged by various policies and measures introduced by the Government over the recent years. The new measures announced by the Govt. in 1986 have been fully implemented and the policies introduced to achieve economies of scale and minimum economic capacity in respect of certain drugs, the broad banding of 31 groups of bulk drugs on the basis of similarity of plant, design process, and production, facilities and the de-licensing schemes have-all contributed to the expansion of the pharmaceutical industry.

The trend in the production of a number of essential drugs is unpredictable till a new drug policy is announced.

In 1990-91, there was an increase over the previous years production of Antibiotics (Streptomycin, ampicillin, Tetracycline and Frythromycin), Sulpha drugs (Sulphace tancide, Sulphamethazole and sulphaphenazole) vitamins (Vitamin A, Vitamin B1, Vitamin B2 and Vitamin C), Analgin, Aspirin, Oxyphenye, Butazone, Dexamethason, Ethambuted, Chloroquin, Insulin Metronidazole, Trimethoprim, Dapsone and vaccines. In the case of certain other bulk drugs, a decline in production during coming years is anticipated. There bulk drugs are chloramphenicol, Oxytetracycline, Sulphadimidine, Folic Acid, Prednisolone, PAS, INH and chloropropancide. In some cases, the reasons for decline is fall in demand for conventional drugs, in view of higher production of newer drugs e.g. in the case of PAS and INH the bulk drug Ethambutol is being used in large quantities for treatment of T.B. As for Chloramphenicol indigenous production in the organized sector from basic stages has been affected by the cheaper production by the small scale sector from imported penimulate intermediates. Thus the availability of chloramphenicol itself has not been affected. Trimethoprim, Metronidazole, and vitamin B1 during the year. It is estimated that during 1992-93 the production of Bulk drugs was of the order of Rs. 11.50 crores and of formulations of the order of Rs. 6000 crores. It is however, obvious that to meet the ever growing demand of the massive population, the production is inadequate with some foreign firm. So the Union Govt. entered into agreement for setting up more units to manufacture not only penicillin but also streptomycin. By the end of the seventh-plan period, it was believed, India will achieve self-sufficiency in the matter of antibiotics the most essential drugs of the present age. The streptomycin factory at Pimpri (Pune) was opened by the late prime Minister Nehru on 29th March 1962.
During fifties and sixties to encourage investment by private capital and business enterprises in India, the National Govt. gave some concessions which enabled hesitant American, companies to come forward with proposals of collaboration, Jhonson & Jhonson, major American manufactures of surgical dressings and baby products entered into an agreement to build a plant of which only 25% was owned by private Indian investors, the plant which is producing such vitally needed products as sutures, surgical dressings, plaster of paris bandages, adhesive, sensitive tape and a host of allied items, was completed in June 1959 at Mulund near Bombay.

On May 2, 1960 Pfizer laid the foundation of an antibiotic plant at Chandigarh, it is now producing tetracyclin and tetracycline. Roche have built a plant at Balkum for manufacturing of vitamin A. This firm had already established another such plant in Bhandup by which India had become sixth country in the world to manufacture Vitamin A. A Rs. 2 crores streptomycin plant set up by Symbiotics Ltd. was inaugurated in April 1964. Among the range of Bulk drugs manufactured by the company are isoniazid niacinamide, vitamin B12 and diodohydroxyquoline. The factory manufacture anti T.B. drugs PAS from basic raw materials was inaugurated on 15th August 1964 at Bombay by wander Ltd.. in collaboration with A wander of Switzerland.

Though on a lesser scale, other western nationals also collaborated with the Indians in the field of pharmaceuticals expansion, important among them were Bayers of Bonn to produce intermediates of chemicals and dyestuffs, as an integral part. Sandoz, Ciba-Geigy of Switzerland to produce synthetic drugs and dyestuffs, and E. Merck of Germany, Glaxo of U.K. and Pfizer of U.S.A. to produce laboratory chemicals.

As we have observed, there are no hard and fast rules to guide the acceptance of foreign assistance, financial and technical. Conditions are governed by the prime purpose that the collaboration should be mutually advantageous.

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>1969-70</td>
<td>2,257</td>
</tr>
<tr>
<td>1977-78</td>
<td>5,201</td>
</tr>
<tr>
<td>1979-80</td>
<td>5,156</td>
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<tr>
<td>1980-81</td>
<td>6,417</td>
</tr>
<tr>
<td>1982-83</td>
<td>6,631</td>
</tr>
<tr>
<td>1983-84</td>
<td>9,000</td>
</tr>
<tr>
<td>1991-92</td>
<td>16,000</td>
</tr>
</tbody>
</table>
Among about 1600 firms engaged in the production of drugs and pharmaceuticals about 250 units are on the list of the Directorate general of technical Development generally known as the organized sector of the industry. Out of the 250 units some of them have a foreign equity of 40% or less. These 250 units constitutes the core of the industry and are responsible for over 40% of total drug production and export out of those 155 firms produce basic pharmaceuticals in bulk for subsequent processing into pharmaceuticals preparations and markets both the classes of products. The value of basic drugs output has been estimated at 1150 crores in 1992-93. The value of basic drug production will increase when plants already approved are implemented. A target of Rs. 1350 crores has been set for basic drugs by 1993-94. The total investment of the firms producing basic drugs is estimated at Rs. 1000 crores in 1991. In addition, there are smaller concerns not registered with the Directorate General of Technical Development.

**EXPORTS**

India is bent upon two things: speedy industrialization and the training of young man who will run the new industries in future. Any offer will welcome if these two aims are fulfilled. Despite the teething trouble during the past years, a sufficient advance has been registered in the direction of producing chemicals used in medicines. There has been also considerable rise in the production of Bulk drugs and formulations.

Twenty nine years ago an Export Promotion Council for chemical pharmaceuticals and other Allied products was set up to promote exports. Delegations sponsored by the council have found many countries to find market for Indian pharmaceuticals. As a result bulk drugs worth about Rs. 850.06 crores have been exported to foreign lands in 1992-93. Drugs of vegetable origin account for an appreciable share in the exports of pharmaceuticals from the country.

Export activity in the field of finished pharmaceuticals is of comparatively recent origin. The industry which began as an importer of finished preparations and which before independence was mainly engaged in processing bulk material into formulations switched over rapidly into basic manufacture. Considerable progress has been made in this direction with the result that the industry is today net foreign exchange earner.
The number of bulk drugs and pharmaceutical chemicals manufactured in the country by the Indian sector today has risen to more than 600. These are produced by a total of 300 companies. During the last one year 58 new items have been added to this list. Scores of new companies have come in the field of bulk drugs manufacture during past few years.

As a sequel to this remarkable growth of the output and the change in the pattern of production the industry has new emerged as an exporter basic chemicals, intermediates and finished preparations.

Bulk Drugs are poised to become the new star on the export firmament. In the four years between 1988-89 and 1991-92 export have scored from Rs. 240 crores to Rs.722.60 crore A decade ago, we were still finding our feet in the international bulk drugs market. Today we are walking tall.

Certainly, there have been sweeping changes in bulk drug exports. India is now perhaps the largest manufacture in the world of many drugs. Indeed, Indian bulk drugs are eagerly sought after in Hamburg, London and New York principal centres of the global pharmaceuticals trade, since they are marginally cheaper than other competing countries products. This is partly because of the rupees depreciation against other foreign currencies. Also many manufacture have consciously tried to keep prices down in order to gain a foot hold in new markets.

The Soviet Union has always been a large buyer of Indian Bulk drug (it still accounts for 33% of the export basket), but Europe (16%) and the U.S. (14%) are catching up since last year.

Strikingly, India's blk drugs czars are not the multinationals, but a bevy of wholly Indian owned companies Ranbaxy laboratories, Lupin Laboratories, candila, Unichem and J.B. Pharmaceuticals, Gujarat Lyka, Cipla, Standard Organics, and Dr. Reddy's Laboratories.

The Pharmaceutical sector achieved noteworthy success in the field of exports during the year 1992-93. During this year it was able to achieve exports at an all time high of Rs. 1410.03 crores, which is much above the exports achieved in the previous years. In the current year the exports are expected to achieve even greater growth. A feature of the exports of Pharmaceutical products is that basic drugs were mainly exported to developed countries while the main markets for finished formulations were the developing countries. Details of the value of the export of drugs
and pharmaceuticals undertaken from the year 1980-81 to 1992-93 are as follow-

Exports of pharmaceuticals consist of basic drugs, intermediator and fine chemicals (including quinine salts exported exclusively by the Govt. and finished formulations.

The industry has been able to build up an export market for Indian pharmaceuticals in the face of fierce competition from manufacturers in foreign countries with a long record of technological growth than ours. The industry now has the range of products and facilities to be able to cater to a growing share of the international market but it has not been able to realise this export potential full. The volume of export in modest so far as compared to total production in the country.

**EXPORTS**

<table>
<thead>
<tr>
<th>Finished Formulations</th>
<th>Bulk Drugs (including Quinine salt)</th>
<th>Total (In Crores)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1965-66</td>
<td>1.16</td>
<td>3.05</td>
</tr>
<tr>
<td>1980-81</td>
<td>55.10</td>
<td>46.38</td>
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<td>1981-82</td>
<td>69.34</td>
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<td>1984-85</td>
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<td>1985-86</td>
<td>106.59</td>
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<td>1986-87</td>
<td>102.12</td>
<td>189.28</td>
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<td>1987-88</td>
<td>88.25</td>
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<tr>
<td>1988-89</td>
<td>157.29</td>
<td>400.16</td>
</tr>
<tr>
<td>1989-90</td>
<td>314.20</td>
<td>664.70</td>
</tr>
<tr>
<td>1990-91</td>
<td>371.40</td>
<td>784.80</td>
</tr>
<tr>
<td>1991-92</td>
<td>558.50</td>
<td>1281.10</td>
</tr>
<tr>
<td>1992-93</td>
<td>553.70</td>
<td>1410.03</td>
</tr>
</tbody>
</table>

Excluding Medicinal castor oil.

There are a number of reasons why exports have not kept pace with the increase in production. The Indian pharmaceuticals industry suffers from some major handicaps.
Drugs exports from India consists of three main categorise: (1) fine chemicals, intermediates and bulk drugs, (2) finished pharmaceuticals and (3) crude drugs.

Each of the above three categories of exports have problems peculiar to it. While the chemicals and basic drugs are exported mainly to the developed countries such as to U.S.A., U.K. and Germany.

**Imports composition**

<table>
<thead>
<tr>
<th></th>
<th>Bulk Drugs</th>
<th>Formulations</th>
<th>Intermediates chemicals</th>
<th>Total (in Crores)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1965-66</td>
<td></td>
<td></td>
<td></td>
<td>8.20</td>
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<tr>
<td>1980-81</td>
<td>87.27</td>
<td>9.62</td>
<td>15.68</td>
<td>112.54</td>
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<td>1981-82</td>
<td>105.06</td>
<td>1.93</td>
<td>29.34</td>
<td>136.33</td>
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<td>1982-83</td>
<td>115.55</td>
<td>5.41</td>
<td>27.52</td>
<td>148.48</td>
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<td>1983-84</td>
<td>123.06</td>
<td>3.43</td>
<td>36.85</td>
<td>163.34</td>
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<tr>
<td>1984-85</td>
<td>178.41</td>
<td>10.17</td>
<td>27.05</td>
<td>215.63</td>
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<tr>
<td>1985-86</td>
<td>208.13</td>
<td>15.82</td>
<td>43.44</td>
<td>267.39</td>
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<tr>
<td>1986-87</td>
<td>207.49</td>
<td>21.84</td>
<td>58.26</td>
<td>287.59</td>
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<tr>
<td>1987-88</td>
<td>234.13</td>
<td>21.44</td>
<td>93.87</td>
<td>349.44</td>
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<tr>
<td>1988-89</td>
<td>328.35</td>
<td>35.43</td>
<td>83.13</td>
<td>446.91</td>
</tr>
<tr>
<td>1989-90</td>
<td>425.64</td>
<td>55.09</td>
<td>171.39</td>
<td>652.12</td>
</tr>
</tbody>
</table>

The Principal market for finished preparations are South-east Asia, Middle East and African countries. Competition is far more keen in the latter because our competitors have many advantages such as economics of large scale production and plentiful supply of cheap raw material etc.

Our position in the markets of the developed countries is less vulnerable in respect of fine chemicals, intermediates and bulk products for which these countries have requirements of a long term nature. Already, Bulk Drugs, fine chemicals and intermediates form a major part of total exports.

As noted above finished pharmaceuticals have to face very keen competitions abroad. There is no doubt that there exists good market for our products in the neighbouring countries in south-east Asia,
Africa and the Middle East. But the prospects for exports in these countries should be assessed against the general background of the economic and political situation existing in the countries.

Almost all the countries in this region have, quite legitimately, nationalist aspirations in the field of industry. In furtherance of this objective they now give several facilities such as liberal loans, land and other incentives for the development of local industries. Attractive terms are also being offered investors to start industrial ventures.

Other factors such as nationalization of import trade in countries like U.A.E., Iraq, Burma, Cambodia and Indonesia, shortage of foreign exchange and protective import policies also restrict the long term scope for direct export to these countries.

Forty five years ago very few people imagined that the pharmaceutical industry in India could take such strides and a time would come which every country would not only aspire to become self-sufficient in drugs and medicines but also begin to export pharmaceuticals to developed and under-developed countries. Though some advance has been made much more remains to be done.

**MANUFACTURE AND MARKETING OF PHARMACEUTICALS**

In the hoary past India has given birth to an indigenous system of medicine called Ayurveda (science of life). In this day it was a fairly advanced science which claimed to cure most of the known diseases with cheap medicines prepared from plants and roots abundantly available in many parts of the country. With the coming of foreign rule eight centuries ago Ayurveda was eclipsed by the Unani system which flourished under the Muslims who became the new rulers.

The allopathic system was introduced by the British in the last century while they were the master of the land. By the time the British rule came to a close in 1947, the Allopathic system had come to stay and had become an inalienable part of the Indian life. To be sure the two older systems were still in existence and the country side sought medical assistance of vaids and hakims of yore but, by the large, the Allopathic systems was in vogue.

During the long years of struggle for freedom one of the cherished slogans raised by the Indians was that independent India would revive Ayurveda and the Allopathic system would be replaced by it. But as will be shown presently, nothing like that had happened and indeed there has
been unprecedented manufacture and sale of Allopathic pharmaceuticals in India since independence, especially during the past forty-five years. Nevertheless, it must be admitted that Ayurveda is making a steady progress and may prove rival in days to come.

PRODUCTION LIMITED-

Before 1947, under the British rule, there was hardly any pharmaceutical industry worth the home producing synthetic drugs. From basic raw-materials, a few manufacturing concerns were no doubt in the field but their activities were confined to production of galenical and biologicals like vaccines, sera and liver extracts. The discovery and marketing of newer drugs like sulphas, antibiotics, vitamins, hormones, antihistamines, tranquillisers and psychopharmacological agents throughout the world changed the older type of therapy and this country had to import all the newer drugs for the local consumption from western countries.

The demand of the newer drugs increased day by day but home was being manufactured in the country, thus the demand had to be met by imports. Consequently some of the reputable international concerns opened their distribution centres in India. The distributors imported drugs and pharmaceuticals from the manufacturing concerns situated in Europe or U.S.A. and sold them in the Indian market. Thus the import of drugs and pharmaceuticals mounted steadily, causing a severe strain on the country's foreign exchange.

RESTRICTIONS IMPOSED-

As a result restrictions were placed on importation of all items which could be produced in the country Thenceforth, a foreign enterprise either had to start manufacturing here or go out of market, one by one all these concerns which had their distribution officer in India and had not felt for establishing manufacturing units so long as free imports were allowed promptly organised processing departments where they could start in time to have basic manufacturing of their products by stages. This was done with the idea of maintaining the market of these products in this country one of the biggest in Asia.
The progress registered in Industrialization during past forty-five years can be assessed by the fact that there are about 800 Industrial units in the country which are engaged in manufacturing of synthetic drugs. The number of bulk drugs, and pharmaceuticals, chemicals manufactured in the country by the Indian sector today has risen to 800. During the last two years 58 new items have been added to this list. Many new companies have come in the field of bulk drug manufacture. Majority in there produce only a limited number of drugs but the variety of drugs now needed in the country in very wide and the range in steadily expanding. Present bulk drugs production in the country is estimated to be about 104 crores. Production extends from analgesics to antibiotics and from salicylated to sulpha drugs covering the range of such important drugs as vitamins hormones. Tranquillizers, antihis tamines and anaesthetics for the treatment and prevention of infectious disease like malaria, tuberculosis and leprosy etc. In 1986 there were not fewer than 100 big pharmaceutical manufacturing concerns, out of which 60 were engaged in the manufacture of one or other basic drugs from the raw materials available locally.

As is evident, this progress has been possible through the initial collaboration of overseas concerns. Indian and foreign capitals joined hands to manufacture drugs and allied products, Also many Indian manufacturers came up during this period, It is remarkable that the maximum number of concerns which started manufacture and marketing of their pharmaceuticals were from U.S.A.

If the Indian Government was rather hasty in imposing restrictions on import of pharmaceuticals, it is now generous in welcoming foreign aid and globalization with the hope that there will be all round progress in production and marketing, as a matter of fact in certain cases it was unexpected as the following figures will show:

Antibiotics-

Antibiotics form roughly more than half in value of the drugs sold in the Indian market the major portion of Penicillin marketed in this country is produced by the Hindustan Antibiotics Ltd. a Govt. of India undertaking. The factory was started with the monetary and technical assistance of UNICEF and WHO. It has reached a peak production rate of parenteral penicillin; in addition Alembic Chemical Works and standard Pharmaceuticals each have been licensed for an annual production of 8.5 mmu of Penicillin. One big manufacturing unit in the
public sector, Antibiotics Factory at Rishikesh, is producing 230 mmu of Penicillin per year. Some more projects in private sector have entered the manufactures of the Antibiotics. On the competition of all the private sector and public sector projects combined production in 1992-93 was 1560.23 mmu. In 1975 Hindustan Antibiotics had started commercial production of Ampicillin, a plant was set up to manufacture ampicillin from 6- penicilloic acid. Over 253 tonnes of Ampicillin was manufactured in India in 1992-93.

A plant to produce streptomycin and dihydrostreptomycin has been installed at Hindustan Antibiotics factory at Pimpri Under the agreement with the Govt. of India. Merck & Co., Inc. had provided technical assistance to the factory for the production of this antibiotics, The plant has produced 109 tonnes of streptomycin and dihydrostreptomycin in 1992-93 from basic raw materials. Symbiotics Ltd. at vadodora have been issued a licence for 60 tonnes of streptomycin per annum. They are in production of the antibiotics from April 1964.

A streptomycin plant with 275 tonnes per annum capacity is in production in public sector Antibiotics factory at Rishikesh. On completion of all the schemes the total capacity is expected to move to over 480 tonnes of this antibiotic per year. Over 243.79 tonnes of streptomycin was produced in 1988-89.

Chloramphenicol is the only antibiotic produced synthetically. Its manufacture was first established by Parke-Davis in Maharashtra, the initial plant capacity being 3.6 tonnes per year and the production commencing from imported levo base. The capacity was later expanded to 10 tonnes per year and the manufacture extended to more basic stage starting with p-nitro-acetophenone. The capacity of this unit is now licenced for increase to 20 tonnes which has been implemented.

Boehringer-knoll in the same state has an installed yearly capacity of 30 tonnes and uses a different process with benzal dehyder as the starting material. The unit started production of chloramphenicol from the year 1960. and is now producing to full Capacity, production in 1992-93 was 109 tonnes of Powder and 17.43 tonnes of Palmitates.
The production of broad spectrum antibiotics of tetracycline group been started in India long back. Tetracycline and chlortetracycline were produced from imported crude materials and their production in 1958 was 2.4 tonnes. In 1961 a new plant with a capacity of 1.5 tonnes of tetracycline was completed at Pimpri. Two U.S. concerns which are main producers, after IDPL, of broad spectrum antibiotics are Prizer and Cyanamid. A 44 tonnes Capacity plant of Prizer is in operation for tetracycline at Chandigarh. It is designed to work on the basic raw materials available in India. A 13 Tonnes production of antibiotics like ledermycin, Achromycin and Aureomycin entirely from indigenous raw material, India produced 134 tonnes of Tetracycline and 193.15 tonnes of Oxytetraacycline in 1992-93.

Other antibiotics produced in the country in 1992-93 were Erythromycin 253.78 tonnes, Amoxicillin 78.08 tonnes, Doxycycline 1.54 tonnes and Gentamycin 88 kg.

Sulpha Drugs-

Manufacture of important sulpha drugs such as sulphamethaxazole, sulphathiazole, sulphapyridine, phthal sulphathiazole is now well established for many years. There are two major units Rhone Poulenc in Maharashtra and cibatul in Gujarat. In both units the manufacture was initially established from imparted penultimate compounds but the unit in Maharashtra has been for several years using more basic raw materials and is now further extending the manufacture. It produces locally p-acetaminobenzene-sulphonyl chloride which is one the two main intermediates in the manufacture of sulpha drugs. Production of sulphacetamide and phthalyl-sulphacetamide is established in West Bengak with total capacity of 16 tonnes per year. Besides The above capacity of 53.5 tonnes has been licensed in Andhra Pradesh to Indian Drugs and Pharmaceuticals Ltd. The main production here is intended to be of sulphadimidine, Sulphaguanidine and sulphacetamide sodium.

In 1973 there was an installed capacity of 2,004 tonnes of sulpha drugs in India but the actual production in that year was about 1298 tonnes. The Sulphas (Sulphadiazine and sulphathiazole) are produced from the higher intermediates by Atul Products an associates of American cyanamid company. Other producers of sulpha drugs Rhone-Poulenc, ciba and German Remedies (Sulphasomidine) Haffkine Institute (Sulphathiazole), East India Pharmaceutical works (Sulphathiazole, Sulphamethazine) Standard Organics and Netson Labe. (Sulphamethaxazole).
Production of sulpha Drugs in 1992-93 was sulphamethoxazole 1592.55 tonnes, Sulphadimidine 41.92 tonnes, Sulphacetomide 38.56 tonnes, Sulphamoxole 52.03 tonnes, Sulphesomidine 0.13 tonnes and sulpheguahidine 48.25 tonnes.

Vitamins-

India still imports its requirements of vitamins from foreign Countries excepting for vitamin A, Vitamin B, and Nicotinic acid amid. Glaxo Laboratories and Roche are Producing vitamin A from B- ionise which is exacted from lemon grass ail obtainable locally in abundance. In 1969 Roche and Glaxo produced about 31.5 mmu of vitamin A, Sarabhai, in collaboration with E.Merck of Germany, had started production of 1,000 Kg. of Vitamin B2 from basic raw materials available in the country. The production capacity of vitamin C of this firm has been increased to 180 tonnes per year which is obtained from sorbitol and glucose, Jayant vitamins are also manufacturing vitamin C. They have produced country's requirement of Vitamin C to the extent of 60%. Its share was only 30% in 1975-776. Merind have a fermentation plant for complete local manufacture of Vitamin B12 is already Producing Vitamin B12, Glaxo, Synbiotics, and Thencis are also producing vitamin B12. Besides these Vitamins, Nicotinic acid amide and Esters are manufactured by chemo-Pharma and IDPL.

Production of Vitamins in 1992-93 was vitamin A 96.73 mmu, vitamin B1 57.32 tonnes, Vitamin B2 20.46 tonnes, Vitamin B6 72.76 tonnes, Vitamin B12 407.00 kg., Vitamin C 871.74 tonnes, Vitamin D2 343 kg. Vitamin E 123.60 tonnes, Vitamin k 2.55 tonnes, Vitamin P 2.47 tonnes, Folic acid 16.98 tonnes, Nicotenic acid 0.60 tonnes and Nicotinamide 100.40 tonnes.

Hormones-

Of the various synthetically produced hormones adrenaline, corticosteroids and sex hormones are produced locally, total production in 1991-92 being 1,992 kgs. Manufacture of different corticosteroids as cortisone, hydrocortisone, prednisolone and plednisolone has been developed in the country based on indigenous raw- materials- diosgenin from dioscorea tubers and hecogin from sical. Steroid intermediates produced from diosgenin are also exported.

During the year 1958-59, India imported 16 kg. of sex hormones, and 67 kg of corticosteroids. At present four plants are being operated, One by Glaxo and the other three by Ciba, Wyeth and cipla for the production of sex hormones. The firms are licenced to produce these drugs from basic
raw-materials. Merind and Glaxo Laboratories have set up plants for the production of corticosteroids from basic raw materials. Cipla and John Wyeth have been licenced for the basic Manufacture of corticosteroids from diorgenin which is locally available and are the largest for Steroids manufacture in India. Cipla is concentrating its efforts on the manufacture of the sex hormones from disogenin.

Production of cortisosteroids in 1992-93 was Decamethasone 488 kg., Betamethasone 1380 Kg., Predmisolone 2069 kg. and Hydrocortisone 4 kg.

Anti-TB Drugs-

Isonicotinic Acid hydrazide is manufactured from gamma picoline by three times in the country, present plant capacity being 72 tonnes per year. Besides this, a capacity of 35 tonnes per year has been planned in the public sector. Manufacture of p-amino salicylic acid was commenced in 1956 with an initial plant capacity of 36 tonnes a year. Now the manufacturing capacity has expanded to 482 tonnes per year and further expansion is under implementation. There are about half a dozen firms in India which are producing INH. During 1982-83 the production of this drug was 128 tonnes, it is estimated that in 1983-84 the requirement went up. In 1960, about 81 tonnes of PAS, were produced by Biochemical and Synthetic products, which has an installed capacity of 100 tonnes per year, India's estimated present consumption is about 400 tonnes per year. Pfrizer had erected a unit with a capacity of 80 tonnes PAS per year. It is estimated that now the country need of PAS has risen to about 560 tonnes per-year. Wander have been licenced for 121 tonnes capacity per year and biological Evens to 35.5 tonnes capacity of PAS.

Production of Anti-TB drugs in 1992-93 was PAS and its salts 5.77 tonnes, ainh 25.45 tonnes. Thiaceotzone 20.58 tonnes, Ethambutol 453.00 tonnes and Pyrazinamide 10.44 tonnes.

Intest and Gastro-Intertinal Drugs-

In 1982-83 India produced 218 tonnes of Halogenated oxyquiniolines which is sufficient to meet the demand for the home market of this type of drugs are produced by products, Sarabhi chemicals, East India Pharm.Alembic, Bengal chemicals Smith stain street, standard pharmaceuticals and Rhone-populenc. All the firms produce it from phenol hydroxyquinoline. In 1982-83 we produced 162 tonnes of Metronidazole and the installed capacity is 137 tonnes. Unique chemicals and Rhone-poulenc are the main firms who are producing the bulk.
The production of Antidysentery drugs in 1992-93 in the country was Metronidazole 559.10 tonnes, Tinidazole 83.55 tonnes, Diloxonide Furote 3.73 tonnes, Iodochlorohydroxyquinolene 224.41 tonnes, Di-lodohydroxyquinoline 7.16 tonnes.

Among the synthetic antileprotic drugs DDS and its derivative (sulphones) are at present produced from the basic stage. Bengal chemicals started production of the drugs on a limited scale before 1952 Burroughs wellcome in Maharatra have established a capacity of 11 tonnes of DDS per-year. Further expansion of the total manufacturing capacity in the country to 52.5 tonnes per year, is planned and Biological Evans (10 tonnes) have been licensed for the production. In 1992-93, 12.56 tonnes of Dapsone were produced. About 2.72 tonnes of clofazimine were produced in the country in 1992-93.

Synthetic Anti Malaria

Chloroquin and ancodiaquin are the only two synthetic anit-malaria manufactured so far in the country. Mention may here be made of pyrimethamine which is produced in small quantity. Manufacturing capacity of 12 tonnes per year for ancodiaquin is established in Maharatra by Parke-Davis. Chloroquin and its salts are manufactured by Bengal immunity (80), Bayer Agrochem (24 tonnes), Rambaxy Labs. (5 tonnes) and Rhone-poulenc (12 tonnes).

In 1992-93, 194.56 tonnes of chloroquin, 12.80 tonnes of Ancodiaquin and 0.13 tonnes of Pyrimethamine were produced in the country.

ANAESTHETIC :-

Of the different anaesthetics the capacity for production in 1955-56 was limited to some common ones such as ether and ethys chloside. Other synthetic anaesthetics like procaine hydrochloride and xylocaine are now manufactured adequately in the country. Manufacturing capacity of 104.50 tonnes the is available for procaine hydrochloride which is manufactured by Hoechst and synbiotics. In 1992-93 production of procaine was 53.27 tons. and of xylocaine 7.72tns.

Analgesics, Antipyretic and Antirhumetics - Analgin, Aspirin, Phenylbutazone, Oxyphenylbutazono, Pethidine, Ibuprofen, Piroxican, and Paracetamol are the synthetics of this group produced at present. For aspirin manufacturing capacity is 560 tons. per year has been established by manufacturers in Maharashatra (97 tns.) and Shri Krishna Fine Chemicals and Pharmaceutical Ltd. in Karnataka has put up a large plant to produce Aspirin, Additional annual production of 150 tns. is also planned in
the public sector. Amongst the other drugs of this group to be taken up all for manufacture in the public sector are Metamezol and phenobarbitone.

The over all picture of Anaesthetics, Antipyretic and Antirhumetics are - Production in 1992-93 was -- Analgin 13.80 tns., Aspirin 1465.86 tns., Phenylbutazone 12.25 tns., Oxyphenyl butazone 9.46 tns., Ibuprofen 655.89 tns., Pethidine 36 kg. Pyroxin 4.07 tns and Paracetamol 2928 tns.

Drugs Of Vegetable Origin -

India produces mirtine, Opium alkaloids, reserpine, Caffeine, Santonin, Quinine, Stryccnine and Brucine, Opium alkaloids are being manufactured at the Govt. of India factory at Ghziabad(U.P.) not only to meet the local demand but also for export to foreign markets. The consumption of caffeine is extematea to be 90 tns. per year locally whereas only 60tns. are produced at the present moment.

BIOLOGICAL PRODUCTS-

We need approximately Diphtheria anti-toxin 4000 mega units, tetanus anti-toxin 30,000 mega units triple vaccine 20 million doses. BCG vaccine 60 million doses. Polio oral vaccine 20 million units and insulin 1400 mega units. Central Research Council, kasauli, Haffkine Institute Bombay, King's Institute, Guindy; and the Pasteur Institute at Connoor and Shillong have expanded their capacities for producing vaccines and anti-toxins. some of private firms have also been licenced to go into production of triple antigens and antisera.

We produced Triple Vaccine 24.95 K.L. Tetanus Antitoxin 9659 MV and Diphtheria Antitoxin

150 Mu in 1989-90.

The prospects of making the country self-sufficient in regard to glandular products also seems be not too bright since our earlier plans. to modernize the abattoirs in our large cities are still in cold storage in the archives of the decision taking agencies of the Government. Investigations conducted by us have indicated that the pancreas of buffalos, goats, sheep and pigs if collected carefully and processed insulin can be obtained in yields comparable to values reported in litera-
ture. We have so far only two modern abattoirs one id Deonar. Bombay under the Greater Bombay Municipal Corporation and the other at Tundla under the Ministry of Defence Production. Through the Co-ordination Council of the Scientific and Industrial Research (Biological Groups of Laboratories) efforts have been initiated in the last few years to utilize the pancreas and other tissues from Tundla for production of insulin, penicillin and cholesterol on a pilot scale to explore mainly the feasibility of using goat and sheep pancreas for Mu insulin production in India. We produced 3097 mu insulin in 1991-92 from imported pancreas.

OTHER DRUGS-

Various other Synthetic drugs like antihistamines, tranquillisers, oral antidiabetics, antifilarial drugs, anthelmintics, stimulants are also produced in the country. A total capacity of 38.20 tns. has been established for manufacture of antihistomines such a pheniramine maleate, diphenhydramine, mepyramine maleate and promethazine, in the tranquiliser and sedative group. Phenobarbitone. Trifluoperazine, imipramine. nitrazepan and dizepam are at present produced of the antidiabetic agents. the drugs manufactured in India are carbutamide. Tolbutamide and glybenclamide the established manufacturing capacity being 183.08 tns. per year capacity for manufacture of cholropamidine has also been implemented.

Besides this there are other synthetic drugs as nikethamide, diethyl carbamazine, murguramidie etc. produced in limited quantities as their requirement is comparatively small. A plant for the manufacture of ephedrine hydrochloride synthetically is put by Boehringer-Mannheim, a firm in Maharrastra, (Production Figure are in tables of progress of the pha. Ind. )

SURGICAL INSTRUMENTS

The public sector surgical instrument plants which started production from August 1967 established with the soviet help is so far a major and organised step forward in this field. The plant is erected at Guindy in Tamil Nadu state. It is producing annually 2.5 million pieces of surgical instruments of 180 type which are used in the general surgery, Ophthalmology, gynaecology and in other branches of medicine About 2,00,000 surgical scalpels, 50,000 tweezers and anequal number of clamps 70,000 surgical scissors and lems of thousands of many other instruments come off the plant every year.

It is however, felt that inspite of progress which is being made in the field of manufacture of surgical instruments the production is inadequate to meet the evergrowing demand of massive
population. More units will be needed in the private sector the meet the demand. If these are forthcoming as expected, time will not be far away when India would become self-sufficient in surgical instruments, X-Ray and other electromedical equipment as in the case of Pharmaceuticals, Indeed it will also begin to export these goods to under developed countries in the south-east Asia and the Middle East.

PROBLEMS OF MARKETING:

While thinking about expansion, the producers have to consider several points regarding marketing products, the main one being that of the price, In the present economic condition the poorer classes of the people afford to purchase expensive drugs. The sole reason why the India seek remedy of ill health through the Ayurveds and/ or Unani systems is the cheap prices of the drugs and pharmaceuticals products they offer. India is an ever-expanding market for the pharmaceuticals, If the prices are within the easy reach of the common man the market can become practically unlimited and the present capacity of the industry can in no way cope with the demand.

If is no surprise that some experienced firms, have jumped into the field and benefited. There is scope for more enterprising spirits to come forward and share the gains because the country continues to depend for many drug needs on imports which can be locally produced. India has not yet achieved self sufficiency so far as drugs and pharmaceuticals concerned. Even today India can not manufacture some of the new drugs which have been discovered in the recent past. It is well known that some drugs are being imported even now.

Thus it will be clear that despite tremendous efforts after independence to revive Ayurveda the indigenous system of medicine, production of allopathic drugs is making progress unknown during the days of the British. There is a network of whole sale and retail dealers in all cities, towns and big villages. The scale organization is rapidly spreading to remotest corner of the country side, Though accurate figures about the drugs and pharmacies are not available it is stated in authoritative quarters their number has more than trebled during the past three decades, India is a vast country inhabited by more than 850 million people whose retirements of pharmaceuticals are enormous. The national government is determined to rise the standard of the people and improve the economic condition of the poverty striker masses. It is natural that with the rise in standard of life the demand for pharmaceuticals will also grow. Already in several respects the supply falls short and are devising ambitious plans for expansion of their plants and factories.