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ETHNOPHARMACOLOGY - A LEAD TO THE ECO-FRIENDLY HERBAL DRUG DEVELOPMENT

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Abstract

Pharmacology means study of medicinal aspect of the use of chemical and plant for the good health and treatment of diseases in man. Ethnopharmacology is related to Ethnos means racial plant medicine used by particular group of people in a country or local area since ancient times forming part of their tradition and culture. Every country has its own ethnopharmacological aspects of medicine, however, Indian and Unani ethnomedicines, which were documented and practiced since millennia. The ethnomedicines of other countries like Greeks, Romans, Egyptians, Babylonians, Persian, Chinese and Arabs hardly provide anything more than the ancient Indian medicines. The knowledge of herbs possessed by the aborigines of America, Australia or Africa is also there but is not well documented. However, the medicine man of every country cannot be ignored, as they were always helpful through their art of healing in various societies and countries.

Key words: Ethnopharmacology, ethnomedicine, tradition, aborigines and Indian medicine.

1. Introduction

The ethnopharmacological aspects of medicines developed along with the primitive man who must have used the herbals for remedial measure for his own sickness and disease, which he was able to procure most easily. During this period man must have experimented and did his first scientific work for his survival in the best way. Medicinal herbs and tools for other activities developed by man through ages during Paleolithic (rough use of flint), Neolithic (polished stones), Tamrayug (using copper for tools and weapons) and the fourth stage, the more civilized Lauhayug (use of iron) was documented in history, however record of herbs is scanty. While developing his tools and weapons man must have experimented on useful herb juices for wound healing fevers and other infectious diseases. However, what herbs they used is not on record but one is sure that their herbal medical knowledge must have been passed on by one generation to the other in the form of cultural and traditional ethnomedicines. We see the first record of herbal medicinal knowledge of Indo-Aryans in the Rigveda (5000 BC) the first book in the library of man. Earlier all Vedic knowledge was passed on from teacher to the disciple through the word of mouth known as "Shruti". Later when Devnagari script was developed in writing the word of mouth was written on "Bhojpatra'. These were maintained from generation to generation and were learnt by heart. Soma was the first Vedic medicine, the extract of the plant which is supposed to be an elixir and a stimulating beverage. However, its real botanical identity is not known till today.

2. History of Ethnomedicine

The first word ever used for medicine is again from Rigveda it was known as Oshadhi meaning thereby heat-producer/energy inducer. So if we go by historical background the first medical knowledge of herbal medicine of about 56 plants was in Rigveda and at a later period, herbal medicine used for snake-bite and many other diseases form the part of "Atharvaveda". Those Vaidyas or doctors who learnt medicine from "Atharvaveda" and applied it for human use were known as "Atharvas". Infact "Atharvaveda" is the first book of toxicology in the world. In the later period the Vedas were followed by Ayurveda. Carak Samhita (2700BC- 600BC), Sushrut Samhita (600BC) form the base of Ayurvedic system of medicine. There were six other Samhitas also Harita and Bhela Samhita and several puranas like Garudapuranam, 1964, Agnipuranam, 1966, Padmapuranam 1960, others were lost. During the period of Buddha also the Indian medicine developed very well and libraries like Nalanda and Takshashila developed and were top in the world and scholars from all over the world used to come to study and improve their knowledge in these libraries. Sanskrit was the main language of the scriptures. During the influence of Buddhism in India and China, Padma Purana 1960 was developed which contains vivid desoription of various medicinal plants like Tulsi *(Ocimum sanctum),* Amalaki *(Phyllanthus officinalis)* and Rudraksha *(Elaeocarpus ganitrus)*. In 200BC most aspect of Ayurvedic medicines were at the top as already pointed out. The jealous Vaidyas destroyed their own literature and kept secret their formulas thus after their death the ethnopharmacological knowledge was lost forever. The Samhitas were not properly preserved thus destroyed, only part of Carak Samhita remained as base of Ayurveda. Spurious slokas on various aspects of herbal medicines were also there in these textbooks of medicines according to the whims and fancies of the medical men. Thus we see Caraka and Sushrut at some places are highly scientific and at the other places only as folklore medicines. Besides these books of Ayurveda we have to learn about medicinal herbs from various natives of India like Kol, Bheel and: Santhal, the natives of Madhya Pradesh, Bihar, Assam and Uttar Pradesh particularly hill people of Uttar Pradesh have many stories to tell us about herbal medicines and their usefulness. Thus from the background of ancient folklore, Ayurvedic and native herbal medicines the present days botany and medicine has to learn a lot.

3. Selection of Herbs

Herbal drug development is a tedious job to do because of the fact that identification matching of plant with ancient literature varies for several plants like *Arnabia noblis, Vinca rosea* both named in Sanskrit as Ratanjyoti. Further each plant has hundreds of biochemical substances and these constituents differ from season to season, soil to soil, and climate to climate. Then proper procurement of these herbs is not very easy. After procurement storage is very difficult as bacterial, fungal infections and enzymatic activity of herb itself takes away the "*Prana*" (life) of the herb and leaves it as a green manure instead of a medicine. The biological activity gets downgraded in these circumstances. It may become very different from the original activity and may even become inactive

substances or toxic medicine without any useful effects on human body system. Thus procurement, storage, moisture content control, these are some important aspects for maintaining the vital medicinal activity of the herb. All institutions dealing with herbal industrial research must develop a standard procedure to maintain herbs viable and alive otherwise the research studies and medicinal use of the herb will remain a dilemma.

4. Ethnopharmacology

Now with the important steps-described above, once the herb is secured fully and is alive, it is fit for use in animal studies as well as for human studies. During 26 years of experimentation in animals we found that whole or part of the herb should be used in the crude form as water suspension by oral route several times to obtain its effect in animal system. Further, various extracts of the plants like petroleum ether, benzene and alcohol etc. change-the bioactivity of the herb and that is why the results of pharmacological tests vary in each case for example several plants have been reported to possess antifertile activity by some scientists while some other scientists found no such activity in them. In many cases animal data is transferable to man and in some cases it is not at all. In the animal model itself there is a variation like morphine produces sedation and constriction of pupil of eye in most of the animals like dogs while it produced aggressive behaviour and dilatation of the pupil in cats, species difference is very marked. Here we can quote the case of thalidomide tragedy where thalidomide a sleeping pill produced seal babies in thousands of women users and it has to be stopped, people are still suffering from its ill effect. After this tragedy it was made necessary to test the teratogenic effect of all medicines but to our surprise again animal test are not proof of this activity as this drug produces teratogenic effect only in man.

In the present times testing and killing of animals is being discouraged all over the world, in vitro testing for immunomodulatory and other activities have become common. However, for toxicity studies of herbal or any medicine in animals are still needed. So for herbals are concerned toxicity studies are not very important and many of these, like Neem (*Azadirachta indica*), Tulsi (*Ocimum sanctum*) etc, are being used as medicinal herbs by thousands of people daily for centuries and without any report of toxicity in man but to be scientific such toxicity studies should be performed to get an idea about its lethal aspects if there is any. A recent study shows the innocuous nature of Tulsi (*Ocimum sanctum*) where LD50 is 2000mg/kg. (Gautan and Goel, 2014, Nunez, et. al., 2017).

Thus with above background when we start thinking about scientific development of herbal medicines we have to go back to ethnopharmacological knowledge of each herb for its use as preventive and curative in human diseases. We have to explore from the ancient literature the exact medicinal use of herbs in number of diseases. For example where a particular herb is used for jaundice in man then we select out the desired herb and test it in animals first for toxicity then for hepatoprotective effects followed by clinical trials in man with study of modern parameters of

pathological tests like SGPT, SGOT, serum bilirubin etc, to see the improvement if any both through Ayurvedic and modern parameters.

After selection of the herbal medicine from ethnopharmacological background, it should be tested pharmacologically in available biological models and clinical trials to confirm its claimed value in the ancient literature. Here herbal research differs from modern synthetic drug in many respects for example the synthetic drugs are of unknown medicinal values made on presumption. Out of several thousand chemicals and after hundreds of animal tests and human trials for clinical use, one chemical is selected for use. Even then sometimes it proves to the highly toxic after long term use examples are thalidomide and practolol. In case of herbal medicines the story is reversed, these have been used by man clinically for centuries. Their usefulness, medicinal values and toxicity if any are well known to the physician to the common people alike. Here we need to confirm their activity as well as assess proper dosage for their effectiveness in man. Examples are Neem and Tulsi. Thus most of the medicinal herbs are clinically known to be effective in various diseases however, confirmation of their activity and other medicinal values need to be scientifically established and learned.

5. Pharmacological test for Adaptogenic activity of Ethnomedicines

Most of the herbals are adaptogens or anti-stress agents we can observe this activity in simple tests such as;

1. Swimming endurance testing in mice
2. Adrenal functions in mice
3. Stress induced ulcers in rats
4. CCL_4 induced hepatotoxicity in rats
5. Anoxia tolerance in rats
6. Audiogenic seizures in rats
7. Bronchial asthma in guinea pigs
8. B.P. in dogs and cats
9. CNS effect in any species of animal
10. Other activities like anti-inflammatory, analgesic, antipyretic, muscle relaxant, antifertility, teratogenic, bowel effect etc. will be done by conventional biological models.

6. Clinical Trials of Herbs: Ethnomedicines

After assessing these parameters in biological models we go for the clinical observation in man in small number of volunteers then go for large-scale clinical observations. Initially a single or double blind clinical trial is done in small number of cases followed by large-scale clinical use of them. Man has naturally selected most of the medicinal herbs and thousands of people are using it every day through Ayurveda, unani and folklore system of medicine. These can be used in man without going for the formalities of the various permissions require for modern synthetic drug. We

need to have correct the dosage schedule for effective clinical effects and record our results confirming the ancient uses while providing scientific base for the same.

7. Conclusion

Herbal drug development is a long procedure which depends on for body system (Sharir) the herbs have been used ethnically in folklore and native medicine CNS-CVS-GIT - musculoskeletal system - respiratory system - renal system - hepatic system - reproductive system or as general tonic (Adaptogen). Most herbs are Adaptogens and anti rheumatic etc. So we give brief experimental studies as well as clinic studies in short to show that how herbals can be developed into scientific medicine. Ethnopharmacology is a novel branch of medicine for exploring scientifically cheap, innocuous (harmless), time tested herbals for benefit of man in health and disease.

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