


MODERN PARAMETERS IN AYURVEDIC RESEARCH
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ABSTRACT

Standardization of herbal delve into includes the recognition of plants, good agricultural practices including cultivation, post-harvesting technology, storage precautions for raw material, manufacturing process with analytical profiles, shelf-life of products and pharmacopoeial standards of quality control. For identification apart from pharmacognostical and chemotaxonomic methods, Deoxyribo Nucleic Acid (DNA) fingerprinting is also being utilized. Quantitative fingerprint of major components would be desirable, which can be done by High Performance Thin Layer Chromatography (HPTLC) or Liquid Chromatography - Mass Spectrometry (LC-MS). The analysis for microbial contamination, pesticide residues and heavy metals for estimating with regards to their permissible levels are also been followed. After confirming all these aspects, the herb is subjected for evaluation of its activity through experimental pharmacology including toxicity studies. Once the herb is screened by these tests, it is evaluated for citations of clinical pharmacological data followed by clinical studies.

KEYWORDS: Research, Microscopy, Radioisotopes, Plant tissue, Electrophoresis.

RESEARCH

The systematic investigation into and study of materials and sources in order to establish facts and reach new conclusions is called as Research.

Research and experimental development comprises creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications.

Take this example, the importance of research in education. Research, with the general aim of systematically, improving an academic body of knowledge may: a) the Deficits in systems may be highlighted by well designed research. The results of research can lead (ideally) to changes in methods or practices (in the case of education it might be a teaching methods, say online Vs in class on campus). This would ideally (further testing would needed to confirm) appropriate education is provided to the students resulting in a more effective/efficient population. b. As suggested above, research determines the success or failure of change in any process or work flow. In other words, the success of any project/ endeavor greatly lies on a good (extensive) research. Without it we will not learn about previously unknown Natural Phenomena that can be used to make new technologies.

Hence, it is important for anyone interested in research in Ayurveda to understand the principles behind it and the rationale behind the methods of diagnosis, treatment, preparation of its medicines etc. Since the bulk of the research is carried out by scientists who are not trained in Ayurveda, caution has to be exercised to make sure that research is fruitful one for Ayurveda.

Here are some modern parameters which are used in Ayurvedic Research to lead Ayurveda on track with Modern Science;

A. MICROSCOPY

Nowadays, microscopic evaluation is indispensable in the initial identification of herbs or detection of foreign matter and adulterants as quality control of **herbal drugs** has been based on appearance.

B. CHROMATOGRAPHY

For colorless material a variety of physical and chemical properties of the compounds have been used to locate them. The choice of methods depends on the nature of the compounds concerned and whether one wishes to chemically alter the material or not. Frequently used methods are-

- 1) Absorption of U.V. light.
- 2) Chemical conversation to colored derivatives.
- 3) Inclusion of tracer amounts of radioactive material.

- 4) Testing for a particular biological activity.
1. Thin Layer Chromatography (TLC): TLC (Thin Layer Chromatography) is extensively used in herbal authentication and mentioned in pharmacopoeia monographs.
2. Column Chromatography (CC): The applications of this technique are wide reaching and cross many disciplines including biology, biochemistry, microbiology and medicine.
3. High-performance liquid chromatography (HPLC): High-performance liquid chromatography (HPLC) is another type of chromatography widely used in the authentication and analysis of herbal substances. It is also used to determine purity, compare claims by raw material suppliers, determine degradation of actives and test shelf life of Nutraceuticals and Dietary Supplements as well as verify the Nutritional Label of a Food or Herbal product.
4. High Performance Thin Layer Chromatography (HPTLC): HPTLC (High Performance Thin Layer Chromatography) finger printing is commonly used in the pharmaceutical and herbal industry for the identification and detection of adulterants in herbal products. It is also used in quality control of herbs and dietary supplements.

Other combined methods

- Liquid chromatography Mass Spectroscopy (LC-MS): Recently, Liquid chromatography Mass Spectroscopy has become the preferable method in many stages of drug development as it combines HPLC with MS.
- Gas chromatography-mass spectroscopy (GC-MS): Gas chromatography-mass spectroscopy (GC-MS) is one of the analytical techniques which is a method of analyzing mixture of components to determine the quantities (concentration) of each of the components.

C. RADIO-ISOTOPES AND THEIR ROLE IN AYURVEDIC RESEARCH

1. Assessment of functioning of different parts and organ system such as Yakrut, Pleeha, Vrikka.
2. Detection of Shat Kriya Kala i.e. Detection of stage of disease.
3. Scanning essential organs such as Yakrut, Vrikka, Avatu granthi etc.
 - a) Helps in studying the size and shape of these organs
 - b) Detection of structural abnormalities.
4. To plan for the treatment i.e. to do surgery or radiotherapy.

USES OF RADIOISOTOPES IN THE TREATMENT OF ARBUDA

Clinical usage of radioisotopes arises from the knowledge that radiation damages the cell nucleus. Mostly cells undergoing division seem especially susceptible to radiation, like cancer cells, which divide more often than normal cells and are most easily killed by radiation than other non-cancerous cells. This property is the basis of radiation therapy in Arbuda.

BOOST AYURVEDA WITH RADIOISOTOPES

(For eg: Kajjali with Rasasindoora tagged with the radioisotope mercury to observe the differential actions). The micro dialysis technique is a unique research tool that allows the simultaneous determination of unbound concentrations of drugs at several tissues and its action on biochemical and clinical markers during several hours and days. Therefore, micro dialysis sampling is an attractive methodology for PK-PD studies. The link between the pre-clinically established PK/PD relationship and its potential to predict clinical outcome in human disease is based on retrospective analyses of individual clinical trials in man or pooling of those trials. Very few clinical trials available in the literature have attempted to prospectively validate the predictive capacity of PK/PD data for clinical outcomes. This does not invalidate the use of each of these models because basic principles of Ayurveda, rasashastra and approaches to treatment can still employ these models and validate potential therapeutic approaches with the ultimate goal being to make the science sustain with safe and effective drugs.

D. TOMOGRAPHY

A radioisotope diagnostic technique of extreme sensitivity is RIA (Radio Immune Assay). It is used to detect antigen substances such as proteins that stimulate the formation of antibodies by the body's immunological system.

E. GENETIC FACTORS FOR DETECTION OF SPECIES

Genetic factors play a central role to induce somatic embryos, i.e. to provide the competence of the species for the process. Here, great variation can be found even within genera such as *Daucus*. Eight of twelve *Daucus* species cultured in identical conditions produced somatic embryos (*D. halophilus*, *D. capillifolius*, *D. commutatus*, *D. azoricus*, *D. gadacei*, *D. maritimus*, *D. maximus*, *D. carota*), whereas four species (*D. montevidensis*, *D. pussillus*, *D. muricatus*, *D. glochidiatus*) were not competent to do so. Under identical culture conditions, only 8 out of 12 species and subspecies of the genus *Daucus* proved capable of somatic embryogenesis.

F. PLANT TISSUE CULTURE

Another area of biotechnology is micro propagation of plants. The aim of this technique is a fast production of a great number of genetically identical plants from a

highly valuable mother plant or e. g. monosexual male and female plants.

G. ELECTROPHORESIS

It is valuable as an analytical technique for detecting and quantifying minute traces of many bio-molecules in a mixture. It is also useful for determining certain physical properties such as molecular mass, iso-electric point, and biological activity.

The electrophoresis process takes advantage of the fact that hemoglobin types have different electrical charges. During electrophoresis, an electrical current is passed through the hemoglobin in someone's blood sample, which causes the hemoglobin types to separate at different rates and form bands. By comparing the pattern formed with that of a normal blood sample, one can see the types and quantities of hemoglobin present in the blood sample.

H. PHOTOELECTRICAL DEVICES

- I. Measurement of light intensity is done by using various photoelectric devices in the advancement of clinical biochemistry.
- 1) Calorimeter 2) Spectrophotometer 3) Fluorometer
- 4) Chromatographic scanners 5) Flame photometer

PURPOSE

Biological substances are present in the various biological fluids such as blood, serum and other biological fluids such as cerebrospinal fluids, pleural and peritoneal fluid. Moreover the concentration in these biological fluids is very low causing difficulty in isolating them. The above two factors have necessitated the usage of photoelectrical instruments

1. Calorimeter: Where simple filters are used.
2. Spectrophotometer: Where prism & diffraction gratings are used.

1) Calorimeter

Applications include drug design in the pharmaceutical industry, quality control in the chemical industry, and metabolic rate examination in biological studies

2) Spectrophotometer

In medical technology, spectrophotometer is used to determine the seriousness of a heart attack by taking an enzyme from the blood of a patient and comparing it to a standard curve.

3) Fluorometer

Device formerly used to measure the amount of ionising radiation emanating from an X-ray tube.

4) Chromatographic scanners

The system can also be extended with a well detector, to carry out simple spectroscopy and classical Nuclear Medicine tests using the optional well counter software.

5) Flame photometer

Measurement of the wavelength of light rays emitted by excited metallic electrons exposed to the heat energy of a flame, used to identify characteristics in clinical specimens of body fluids.

DISCUSSION AND CONCLUSION

Research in Ayurveda is being carried out along the lines of allopathic medicines and sciences; it would be interesting to see whether a similar situation exists in the case of current Ayurvedic research. In other words, is the scientific research in Ayurveda carried out in response to the queries and demands put forth by Ayurvedic physicians, the answer is sadly a "no".

Just as research in allopathic medicine takes the system forward and helps in its advance, research in Ayurveda should also help in the development of the system and in taking it forward.