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"The Scope Of Application Of Modern Pharmacology In The Field Of Ayurveda Drug Formulation- A Literary Review Article"

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Abstract: **-** Ayurveda drug formulations or Ayurveda drug pharmaceutics is known with the special branch Ras Shastra & Bhaishajya Kalpana. Basically it is a science which mainly deals with processing and formation of Organic & Inorganic elements into such forms which are Non Toxic and can be utilized for prevention & cure of disease with promotion of health. Pharmacology is the science of how drug act on biological system and how the body respond to drug i.e. Pharmacodynamics and Pharmacokinetics respectively. The term of Modern Pharmacology is different for Ayurveda. Ayurveda Pharmacology is understood by understanding the concept of Rasa-Virya-Vipaka and Karma of drug. Out of these Rasa-Virya and Vipaka are the Physiochemical and Biochemical properties whereas Karma or Action of drug towards body comes under Pharmacodynamics. The term Pharmacokinetic is not exactly explained in Ayurveda. Many of drugs are compound formulation. The Pharmacokinetic or Liberation, Absorption, Distribution, Metabolism and Excretion of such formulations are not completely known till date. We are tried here to determine the gap between understanding Pharmacodynamics and pharmacokinetics for Ayurveda drugs. There is huge scope for application of Modern pharmacology for Ayurveda formulations. It will certainly help to improve the Posology and encourage the Research and Development of Ayurveda drugs.

Keywords**: -** Pharmacology, Ayurveda Drug Formulation.

INTRODUCTION: - Rasashastra and Bhaishajya Kalpana is the discipline from Ayurveda which deals with distinctive methods or techniques of drug formulations. Natural Herbal and Mineral drugs are used for medicine preparation. Different permutation combinations are used to make such Herbo-Mineral drugs. Various processes like Grinding, Heating, Roasting, Boiling and Trituration are mentioned for medicine preparation in classical texts of Ayurveda. These processes help to make drug nontoxic, rich with potency, more palatable and increase shelf life of drug[(1)]. These medicines are used for preservation of health and treatment of disease.

Modern Pharmacology is the study of science how drugs affect biological system. It has two main branches, Pharmacodynamics and Pharmacokinetics. Pharmacodynamics refers to the molecular, biochemical and physiological effect of drug towards body. Whereas Pharmacokinetics deals with the absorption, distribution, metabolism and excretion of drug[2]. Ayurveda has different concept of Pharmacology[3]. It is understood by understanding concepts like Rasa- Virya- Vipaka and Karma of Drug. It is limited up to the Physiochemical and biochemical properties and mechanism of action in some extent. But the Pharmacokinetics is not precisely explained for Ayurveda drugs. Researchers have large scope to apply and understand Modern pharmacology for Ayurveda drugs. It will facilitate evidence based research for Ayurveda Drug formulations and we can update use of such drugs without hesitation at large scale on modern criterion also.

AIM: - To make critical review of literature for finding the scope of application of modern pharmacology in the field of Ayurveda drug formulation.

MATERIAL AND METHODS: - Classical text books of Ayurveda, Modern textbooks and research work available related to topic from authentic sources of internet.

1) Charak Samhita
2) Sushruta Samhita
3) Ashtanghrudaya Samhita
4) Sharangdhara Samhita.
5) Ras Ratna Sammuchaya
6) Yogratnakara
7) Bhaishajyaratnavali
8) Essentials of Medical Pharmacology
9) Text book of Pharmacology.
10) Scholarly articles from authentic sources of internet.

Observation:- Rasashastra and Bhaishajya Kalpana consist of word Rasa , Bhaishajya, Kalpana and Shastra. The term Rasa is employed here for the use of Rasa / Parada or Mercury in medicines[4]. Bhaishajya literally means Aushadha or Medicine. The substance which is used for medicine by the physician is Bhaishaj[5]. Kalpana are the different processes or methods used for drug preparation. Shastra is a Science. So basically Rasa Shastra and Bhaishajya Kalpana is the special branch in Ayurveda where studies of different techniques are performed for the preparation of Herbo- Mineral medicines. Natural substances are used for formation of drugs like;

Element- Parada/ Mercury

Minerals- Abhraka/ Mica, Gandhka/ Sulfur, Makshik/ Chalco pyrite, Vimala / Iron pyrite, Hartala/Orpiment, Manashila/ red Arsenic etc.

Metals- Loha/ Iron, Tamra/ Copper, Suvarna / Gold, Rajata/ Silver, Vanga/ Tin etc.

Alkali Minerals - Sajjikshara/ Soda Bicarbonate, Tankankshara/ Borax etc.

Rock Minerals- Sudha / Lime stone.

Gem Stones- Manikya/ Ruby, Pushakaraj/ Topaz, Tarksha/ Emerald, Moutika/ Pearl etc.

Herbs- Guduchi, Guggulu, Aamlaki, Shunthi etc.

Different techniques like Grinding, Heating, Boiling, Roasting, Trituration etc are used to prepare drug. Some unique equipment is used for these methods to formulate special dugs. These drugs are single or compound formulations. Different forms of these Drugs are-

Guti/ Vati- Tablet	Churna - Powder
Kwatha - Decoction	Svarasa- Juice
Kalka - Paste	Rasakalpa - Herbo Mineral preparation
Sharkar - Syrup	Aasava & Arishta – Fermentative preparation
Khandakalp- Granules	Tail/ Ghruta – Medicated Oil or Ghee
Avaleha – Confection	Arka- Distillation Preparation
Satva- Starch Extraction	Lavankalpana – Medicated Salt preparation
Gud kalpa- Jaggery Confection.	

1] Ayurveda Drug Pharmacology[6,7,8]:- It is explained under the terms – Rasa, Virya, Vipaka, Prabhava and Karma of the Drugs. It is provided for Single dugs only; we have to determine these properties for Compound Drugs also.

I. **Rasa / Taste:-** The potency of drug which is perceived by taste buds. E.g. Madhur, Amla, Lawana, Katu, Tikta and Kashaya are the Rasa.

II. **Virya / Potency:-** It is the potency by which drug produces its therapeutic effect. E.g. Ushna and Shita.

III. **Vipaka / Drug Metabolism:-** It is the potency of a drug which is responsible for the change in original taste on exposure to Gastro Intestinal Tract and which is responsible for the final form of drug inside body. E.g. Madhur, Katu and Amla.

IV. **Karma / Action:-** The action of drug toward different system of body. E.g. Shulaghna, Shothaghna etc.

V. **Prabhava / Nonspecific action:-** It cannot be explained and we cannot predict the reasoning behind its action. E.g. Guggulu have Rakshoghna action and its Prabhava.

These terms explain the Physiochemical and biochemical properties of drug up to some extent.

2] Modern Pharmacology:- It is consist of Pharmacodynamics and Pharmacokinetics.

A) Pharmacodynamics[9]:- The study of effect of drug on body and its mechanism of action. Most of drugs exert their effect by -

a) Binding to Receptor protein located in Cell membrane Or

b) With other routes like – Enzymes, Hormones, Voltage gated Channels and Transport Proteins.

Effect of a Drug:- Effect is the response of a Drug where it is bonded with Specific Targeted receptors only. E.g – Hypoglycemic or Antipyretic effect.

Efficacy of a Drug:- The extent to which a drug can produce a response when all the available receptors or binding sites are occupied. E.g. Analgesic drugs have some Anti-inflammatory action also.

Potency of a Drug:- The potency of drug is related to its affinity for the receptors. The amount of a drug required for a given response is a Potency of Drug. The drug which gives more biological effect at low concentration is more potent.

B) Pharmacokinetics[10]:- The response of body towards drug is Pharmacokinetics.

I. **Absorption of Drug: -** Most of drugs are administered through Oral route and absorbed through Gastro Intestinal Tract. Cell membrane of GIT is lipophilic so lipid soluble drugs are easily absorbed. Water soluble drugs absorption is slower and can be incomplete. Rate of absorption depends on condition of GIT.

Widely used second route of administration is Intravenous. Whole drug enters into circulation and become available for use. 100 % Bioavailability is achieved with this route. With other routes bioavailability decreases as proportion of drug reaches to circulation is reduced.

II. **Distribution of Drug: -** After reaching in systemic circulation drug is distributed throughout the body and enters the Interstitial and then intracellular space. The rate and extent of this distribution depends on the binding of drug to plasma proteins and its Lipid solubility.

III. **Metabolism of Drug: -** Principle site of drug metabolism is Liver. Other like Kidney, Lungs can metabolize drug up to some extent. Drug metabolism has two actions-

a)To inactivate the drug, so there is no further Pharmacological action.

b)Most drugs are lipid soluble but for excretion need to convert in more water soluble form.

IV. **Excretion of Drug: -** In metabolism of drug they are converted in to more water soluble form and excreted through Kidney in Urine. Some has conjugation with bile and excreted through bile in feces.

Routes of Drug administration [11]:–

Sr.No	Modern Drugs administration Route	Ayurveda Drug administration Route
1	Oral	Mukha / Oral
2	Rectal	Guda/ Anorectal
3	Sublingual	Nasa/ Nasal
4	Parenteral	Karna/ Ear
5	Topical	Akshi/ Eyes
6	Buccal	Twak/ Dermal
7	Inhalation	Uttar Marga/ Vaginal or Urethral

DISCUSSION:-

A] Pharmacodynamics of Ayurveda Drugs:- The Rasa, Virya, Vipaka and Karma comes under Pharmacodynamics. But only Physiochemical and Biochemical properties has given. Chemical composition and active ingredient of a drug is still not known for many drugs. These Rasa, Virya, Vipaka and Karma have given for Single drugs, but for compound drugs it has not elaborated.
In case of Karma or Action of Drug it is explained as Jwaraghna, Shulaghna, and Shothaghna etc. These actions are Efficacy of that drug. E.g. Tribhuvankirti is Jwaraghna[12], it is its Efficacy towards body. Because it has multifactorial action like Purification of Channels, Elimination of Bio toxins, Digestion of some unwanted bodily substances & Increase in digestive fire with cumulative action of lowering body temperature. So we have to find the exact mode of action of such drugs and their effect on body like antipyretic etc. according to modern science.

B] Pharmacokinetics of Ayurveda Drug: - Vipaka comes under Pharmacokinetics of Ayurveda drugs for some extent. But precise information of Absorption, Distribution, Metabolism and Excretion has very less available in classical Ayurveda texts.

I. **Absorption: -** Oral drugs are absorbed by GIT, but for other routes like Nasya, Akshi etc. smaller details are available.
II. **Distribution:-** Some are Lipid and some are Water soluble. So the distribution of drugs has to be studied neatly as per their route of administration.
III. **Metabolism: -** Specific metabolic reactions are not much known and for Special routes like Nasya the site of metabolism also has to be defined.
IV. **Excretion: -** As fewer facts are available about the metabolism, the route of excretion is not known for many drugs especially which are administered through special routes like Nasya, Karna etc.

CONCLUSION:-

From the above observation and discussion, we can say that there is huge gap between understanding the Pharmacology of Ayurveda drugs according to Modern concepts. And researchers have great scope for their research in areas like-

1) There is great scope of research for finding Mode of action, Absorption, Distribution, Metabolism and Excretion of Ayurveda formulations.
2) The Pharmacodynamics and Pharmacokinetics has to be studied deeply for unique route of drug administration like- Nasya, Karna, Akshi etc.
3) As there is no Intravenous route of administration for Ayurveda drugs the precise research is needed to increase the Bioavailability and Potency of such formulations.
4) Concise knowledge about the Effect and Efficacy of Ayurveda drugs has to be studied so it will help to optimize the Posology of drugs.
5) In modern Pharmacology there are different formulation of Tablets are available like- Double strength, Extended release, Enteric Coated, Delayed release, Mouth dissolving, Dispersible etc. There is scope for research to get the knowledge about modern Pharmacology for Ayurveda drugs so it will help to develop such forms of Ayurveda formulations for desired effect.
6) Nasya, Akshi, Karna are route of administration where they provide not only Local but also Systemic action of drugs. Formerly they are used as an Emergency drug administration routes. So for these routes, drug forms like Spray, Apllicapsules, Drops, Inhalation liquid repulse has to be researched for quick actions in emergency conditions.

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