



## “Ayurvedic Insights into Pharmacokinetics and Pharmacodynamics: A Contemporary Approach”

*Dr. Nikita Meghwal<sup>1</sup>, Dr. Rajesh Chandra Mishra<sup>2</sup>, Dr. Eresh Jamwal<sup>3</sup>, Dr. Sana Kausar Sindhi<sup>4</sup>, Dr. Suman Bishnoi<sup>5</sup>*

<sup>1,3</sup> M.D. Scholar, Department Of Dravyaguna Vigyan, MMM Govt. Ayurved College, Udaipur (Raj.).

<sup>2</sup> Asso. Professor, Department Of Dravyaguna Vigyan, MMM Govt. Ayurved College, Udaipur. (Raj.).

<sup>4</sup> M.D. Scholar, Department of Shalya Tantra, MMM Govt. Ayurved College, Udaipur, (Raj.).

<sup>5</sup> M.D. Scholar, Department of Kayachikitsa, MMM Govt. Ayurved College, Udaipur, (Raj.).

**Corresponding Author:** Dr. Nikita Meghwal, M.D. Scholar, Department Of Dravyaguna Vigyan, MMM Govt. Ayurved College, Udaipur (Raj.).

**E Mail id –** [meghwalnikita123@gmail.com](mailto:meghwalnikita123@gmail.com)

### ABSTRACT:

The pharmaceutical terms pharmacokinetic define as process “what body does to the drug” means biological transformation of drug molecule inside the body. Similarly another term pharmacodynamic defines as process “what drug does to the body” means pharmacological action of drug. The classic Indian system of health management Ayurveda suggested different approaches for the restoration of normal health and treating diseases. As per ayurveda the natural drugs exerts their action by virtue of their Guna, Rasa, Vipaka, Prabhava and Virya. These properties of drugs contribute towards the pharmacodynamic profile of ayurveda drugs. The process of biotransformation of drug in ayurveda can be described as Vipaka which relates pharmacokinetic transformation of natural drugs. The ayurveda perspectives on drug’s action need to be explored with modern concepts therefore present article summarizes pharmacokinetic & pharmacodynamic aspects of drugs with reference to Ayurveda principles and theories.

**Keywords:** Pharmacokinetic, Pharmacodynamic, Ayurveda, Biotransformation

### INTRODUCTION:

Ayurveda described drug as an important entity one among the *Pada Chatustaya*. The success of any therapy depends upon selection of appropriate drugs and their dosage forms. *Kwatha, Vati, Churna, Ghrita* and *Taila*, etc. are various types of Ayurveda formulations. The Ayurveda drugs exert their action by virtue of their characteristics i.e.; Rasa, Guna, Vipaka, Prabhava and Veerya. <sup>1</sup>The Ayurveda concept of Panchabhouthik principle, concept of Vriddhi, Saamyā & Kshaya, Samanya, Vishesha, Samavaya, Karana & Karya dravyas, etc. are attributed to the particular pharmacological action of drugs. Ayurveda belief that action of drug greatly depends upon their timing of administration, state and age of patient, dosage and combinations with other ingredients. The proper knowledge of drug action is very essential to plan correct therapeutic measures for specific pathological conditions. The therapeutic approaches of Ayurveda science not only comprises scientific and practice based theories for healthy living but it also encompasses holistic ways of healthy regimen. Ayurveda described concepts of *Rasa, Guna, Veerya, Prabhava & Vipaka* through which pharmacokinetic, pharmacodynamic and toxicological effects of drug molecule could be understood. Similarly the strength or potency of drugs as per ayurveda theories can be defined using terms *Mrudu, Madyama & Teekshna*. *Mrudu* means low strength or efficacy, *Madyama* means moderate potency and *Teekshna* means high potency of drug molecule. The modern pharmacology emphasizes role of properties or chemical structure of drug molecule towards its pharmacokinetic & pharmacodynamic behavior over the constitutional component of individual therefore physiological & metabolic behavior of drugs inside the body depends upon its properties or chemical structure.

### MATERIAL & METHOD:<sup>2</sup>

Pharmacodynamics—what drug does to the body?

Pharmacokinetics----what body does to drug?

That means...

Physiological & biochemical effects of drugs & their mechanism of action at macromolecular/a sub cellular/organ system level is Pharmacodynamics.

Movements of the drug in & alteration of drug by the body includes Absorption, Distribution, Metabolism, Excretion (ADME) of the drug is Pharmacokinetics.

After the administration - the drug follows the following steps-

- ❖ Absorption (*Grahanam*)
- ❖ Distribution (*Vyapti*)
- ❖ Metabolism (*Paka*)
- ❖ Excretion (*Nishkramana*)

**Absorption** – means how a substance get assimilated in to *Dhatus* (Body tissues).

All of this depends on the digestive fire (*Agni*), proper digestion is critical for optimal absorption, emphasizing the need for a strong digestive system. As per Ayurveda the site of absorption means *Adhikarana* depends upon properties of compounds thus compounds offers different properties get absorbed differently.

1. According to Ayurveda, *Amashaya* is the place for *kapha*. Thus *snigdha* (Lipid soluble), *Seeta* (non ionized) and *Guru* (heavy in molecular weight) are supposed to be absorbed there.
2. *Grahani* is the place for *Pitta* and substances having properties like *Snigdha* (Lipid soluble), *Ushna* (ionized) and *Laghu* (smaller in molecular weight) are absorbed there through the *Pitta dhara kala*.
3. *Pakwashaya* is the site for *Vata* and thus, *Ruksha* (water soluble), *Seeta* (non ionized) and *Laghu* are absorbed here.
  - *Amashaya* – oral cavity to 1st part of duodenum.
  - *Grahani* - 2nd Part of Duodenum to caecum.
  - *Pakwashaya* – Caecum to rectum.

<sup>3</sup>Similarly in *Ayurveda* route of administration and types of vehicle (*Anupanas*) used for drug administration also play important role in drug transportation throughout the body. Honey, water, pepper, herbal juices and milk or Ghee, etc. can be used as *Anupanas* to administered solid dosage forms since these vehicles by virtue of their properties (*Guna*) facilitate process of drug transportation.

<sup>4-8</sup>In modern pharmacology it is explained that crystalloids are easily absorbed then colloids. Gases are absorbed through respiratory system and solids and liquids are absorbed through GIT. These concepts already exist in *Ayurveda*. It is well known fact that *bhasmas* (Mineral ashes) are in the colloidal state. Where ever the sustained release effect or delayed effect is required either the mineral or herbomineral drugs were used, *Dhupa* (fumes) and *Dhumapana* (medicate smoking) etc. were used to introduce the drug for respiratory problems. Drugs like; *Amalaki* (*Phyllanthus embelica*) acidic in nature absorbed rapidly from the stomach (acidic environment) while *Aswagandha* (*Whithania somnifera*) is basic drug not absorbed effectively in stomach but absorbed in small intestine (alkaline environment).

**Distribution (*Vyapti*)** : The distribution of a substance to different parts of the body in *Ayurveda* is governed by the *Srotas* (Body Channels). Each herb or preparation is believed to target specific *Srotas* based on its properties.

**Metabolism (*Paka*)**: The metabolic transformation is substance in *Ayurveda* is described through the concept if *Vipaka*, which refers to the change in the substance's properties after digestion. *Vipaka* determines the long term effect of a substance on the body.

*Madhura Vipaka*- (sweet post digestive effect): Nourishing.

*Amla Vipaka* – (Sour Post digestive effect): stimulates digestion.

*Katu Vipaka* – (Pungent effect): Detoxifying and drying.

**Excretion (*Nishkramana*)**: The removal of waste products is managed through various *malas* (waste byproducts), including urine (*mutra*), faces (*Purisha*), and Sweat (*Sweda*). Certain herbs and formulations in *ayurveda* are specifically designed to promote elimination and detoxification.

## Pharmacodynamic Aspects: <sup>9-11</sup>

Drug gets administered inside the body then it forms *Sara-Kitta Vibhajana* (absorbable & excretal fractions) due to the action of *Agni*. The *Sara bhaga* (active principles) of *Dravya* (drug) goes to *Hrudaya* and circulates all over the body under the influence of *Vyan Vayu*. *Sara Bhaga* resides in body tissues causes growth (*Vrudhhi*) and loss (*Kshaya*) of particular tissue (*Dhatu*) leading to the pharmacological effects. The action (*Karma*) in *ayurveda* can be attributed to the following qualities of drug:

- ❖ *Rasa* means taste of drug
- ❖ *Guna* means basic nature of drug
- ❖ *Veerya* means potency of drug
- ❖ *Vipaka* means bio-transformation of drug, this mainly relates with pharmacokinetic effect
- ❖ *Prabhava* means overall effect of drug.

These qualities of drug alter *Doshas* (biological entities), potentiate *Dhatus* (tissues), removes *Mala* (waste), clear *Srotas* (circulatory channels), and boost *Agni* (digestive & metabolic power) thus bring biochemical alteration resulting pharmacological responses

- ❖ *द्रव्याणि हि द्रव्यप्रभावादगुणप्रभावाद्रव्यगुणप्रभावाच्च तस्मिंस्तस्मिन् काले तत्तदधिकरणमासाद्य तां तां च युक्तिमर्थं च तं तमन्नि प्रेत्य यत् कुर्वन्ति तत् कर्म, येन कुर्वन्ति तद्विर्यं, यत्र कुर्वन्ति तदधिकरणं, यदा कुर्वन्ति स कालः, यथा कुर्वन्ति स उपायः, यत् साध्यन्ति तत् फलम् ॥ च. सू. २६/१३*

Acharya Charaka stated that there are three means by which the *Karma* is produced –

***Dravya Prabhava*** – Because of its strength *dravya* gives rise to *karma*.

***Guna Prabhava*** – The *karma* produced by the constituents residing in a *Dravya*.

***Dravya Guna Prabhava*** – It is the combined contribution of both *dravya* and *Gunas* to produce any *Karma*.

**Acharya Charka has also given the following terms involved in *Karma***

*यत् कुर्वन्ति तत् कर्म*- One which is performing an action (*Kriya*). *येन कुर्वन्ति तद्विर्यं*- The potent factor responsible for an action. *यत्र कुर्वन्ति तदधिकरणं* - Where the action is performed that is *Adhikarana*. *यदा कुर्वन्ति स कालः* - When the action is done that is *Kala*. *यथा कुर्वन्ति स उपायः* - How the *karma* is performed that is *Upaya*. *यत् साध्यन्ति तत् फलम्* - The outcome after the action is *Phala*.

<sup>12</sup>**Chakrapani** has given very clear explanation regarding different modalities with example of

<b>1. Shirovirechana Karma-</b>
<b>Karma-</b> Dravyas used to perform Shirovirechana karma should produce Shirovirechana Karma.
<b>Virya</b> – The factor responsible for shirovirechana karma is virya of it.
<b>Adhikarana</b> – Adhikarna is Sira.
<b>Kala</b> – Vasantadi Ritus when the person having sirogauravata.
<b>Upaya</b> – Considering the procedure like Pradhamana or Avapidana Nasya administering the Ausadha in proper position.
<b>Phala</b> – After the procedure the desired result, if the patient is relieved from heaviness of head then it is called Phala.
<b>2. Deepana Karma –</b>
<b>Veerya</b> – in the deepana karma we generally use ushna veerya dravyas.
<b>Adhikarana</b> – Agni
<b>Kala</b> – Agnimandya
<b>Upaaya</b> – Agni Deepana dravyas
<b>Phala</b> – normal jarana and abhyavaharana.
<b>3. Lekhana Karma –</b>
<b>Veerya</b> – Ruksha, Ushna, Laghu
<b>Adhikarana</b> – Medodhatu, Mala
<b>Kaala</b> – Medovridhi, Medasaavrittha vata
<b>Upaaya</b> – Dhatumala vishoshana, Dhatumala lekhana.
<b>Phala</b> – Medovishoshana.
<b>4. Pachana Karma –</b>
<b>Veerya</b> – Ushna, Ruksha, Laghu
<b>Adhikarana</b> – Ama in Agantu dosha
<b>Kaala</b> – Saamadasha, Saamadushya
<b>Upaaya</b> – Amapachana
<b>Phala</b> – Niraama dosha, Niraama dushya
<b>5. Anulomana Karma –</b>
<b>Veerya</b> – Laghu, ushna, snigdha
<b>Adhikarana</b> – Agantu dosha in dhatu, mala, srotas
<b>Kaala</b> – Gati rodha owing to dosha in dhatu, mala or srotas
<b>Upaaya</b> – Vata varcho anulomana
<b>Phala</b> – Aprathighatha in all kriyas (uninterrupted physiological activities).
<b>6. Virechana Karma –</b>
<b>Veerya</b> – Guru, teekshna, ushna
<b>Adhikarana</b> – Hridaya, agni, dosha, koshta, pakwashaya.
<b>Kaala</b> – Samyak snigdha, samyak swinna
<b>Upaaya</b> – Samyak virechana by logical selection of guna vipareetha aushdha to aganthu dosha, agni and koshta
<b>Phala</b> – Sroto vishuddhi indriya prasada, laghutwa, bala, agni, dhatu sthiratwa
<b>7. Chedana Karma –</b>
<b>Veerya</b> – Ushna, tikshna, ruksha,
<b>Adhikarana</b> – Kapha, rakta, krimi, kleda
<b>Kaala</b> – Sanchitha kapha, kledavidhi
<b>Upaaya</b> – Forceful expulsion of agantu kapha, kleda & krimi
<b>Phala</b> – Laghutwa, karmasamarthya, agni deepti, kleda – kaphakshaya
<b>8. Madakari Karma –</b>
<b>Veerya</b> – Ushna, teekshna, ruksha, vyavayi
<b>Adhikarana</b> – Agni, hridaya, buddhi, ojus, manovaha srotas
<b>Kaala</b> – Normal buddhi before shalyakarma
<b>Upaaya</b> – Buddhi lumbana (obscurement of buddhi)
<b>Phala</b> – Mada
<b>9. Medhya Karma –</b>
<b>Veerya</b> – Prabhava
<b>Adhikarna</b> – buddhi, agni, ojus, manovahasrothas, sadhakapitta
<b>Kaala</b> – Alpa medha, ojakshaya, buddhimandya, sadhakapitta dushti
<b>Upaaya</b> – Ojo vridh management in accordance to the status
<b>Phala</b> – enhanced learning power
<b>10. Vayasthapana Karma –</b>
<b>Veerya</b> – Sheeta, snigdha, laghu, manda
<b>Adhikarana</b> – Agni, ojus, rasavaha srotas

<i>Kaala – Poorvavayas, madhyavayas, swasthya</i>
<i>Upaaya – Agni sandeepana, ojasya, santarpana</i>
<i>Phala – Late aging process, prolonged youth, tushti, bala</i>
<b>11. Rasayana Karma –</b>
<i>Veerya – Guru, snigdha, ushna</i>
<i>Adhikarana – Agni, rasavaha srotas, dosha, ojus, buddhi</i>
<i>Kaala – Poorva vayas, madhyavayas, vyadhi</i>
<i>Upaaya – Ojasya, medha vardhaka, santarpana</i>
<i>Phala – Vyadhi shamana, tushti, pushti, bala, medha vriddhi</i>
<b>12. Vajikarana Karma –</b>
<i>Veerya – Sheeta, snigdha, pichila, guru</i>
<i>Adhikarana – Shukra, agni, shukravaha srotas</i>
<i>Kaala – Shukrakshaya, shukrastambhana, shukra vriddhi, shukra ashmari</i>
<i>Upaaya – Shukrala, shukra rechaka, shukra sthambhana, shukra shoshana</i>
<i>Phala – Samyak shukra pravritti</i>
<b>13. Sonitha sthapana Karma –</b>
<i>Veerya – Laghu, snighadha, manda, anushna seetha</i>
<i>Adhikarana – Agnatu dosha in raktadhatu, raktavaha srotas, agni, rasavaha srotas</i>
<i>Kaala – Raktakshaya, raktashithilata, raktadushti</i>
<i>Upaaya – Rakta vriddhi, rakta sthairya, rakta shodhana</i>
<i>Phala – Raktadhatuj saara purusha lakshanas</i>

## Result and Discussion:

The *Ayurveda* science comprises many branches and *Samhita* is one of such branch which deals with basic principles of health management. *Ayurveda Samhita* mentioned various theories related to the diseases pathogenesis and their treatment. *Tridosha, Dhatus, Mala, Srotas* and *Agni*, etc. are essential biological components responsible for physiological functioning of body. Alteration in these biological entities may result pathological manifestation and balancing state of these components provides healthy life. The drugs help to correct vitiation or aggravation of *Tridosha, Dhatus, Mala, Srotas* and *Agni*. The pharmacological action of drugs facilitate by their properties like; *Rasa, Guna, Virya, Vipaka* and *Prabhava*. Here it can stated *Rasa, Guna, Virya* and *Prabhava* contributes towards pharmacodynamic profile of drug while *Vipaka* resembles metabolic pharmacokinetic of *Ayurveda* drugs. However it is still require exploring pharmacodynamic and pharmacokinetic concepts as per *Ayurveda* theories in details so that modern and classical sciences come together for bridging gap amongst medical fraternities.

## REFERENCES :

1. Frawley, David, *Ayurveda And The Mind – The Healing Of Consciousness*, Motilal Banarasi Dass Publishers, Delhi, 1998; 11 – 38.
2. K. Nishteshwar, *Basic-Concepts-of-Ayurvedic-Pharmacology*, Chowkamba Sanskrit Series Office, Varanasi, 2007.
3. Charak Samhita, *Ayurveda Dipika Commentary of Chakrapani Datta*, Edited by Vaidya Jadavji Trikamji Acharya, Chikita Sthana 15/3-4, , Published by Chowkhamba Orientalia, Varanasi: 2007, p. 512.
4. Wujast-Vk Dominik, *The Roots Of Ayurveda (Revised Ed.)*, Penguin Books India, 2001.
5. Sushruta, *Sushruta Samhita (With the Nibandh Sangraha Commentary)*, Edited by Vaidya Jadavji Trikamji Acharya, Chowkhamba Orientalia, Varanasi. 2009, Sushrut sutra 40/10, p178.
6. Charak Samhita, *Ayurveda Dipika Commentary of Chakrapani Datta*, Edited by Vaidya Jadavji Trikamji Acharya, Sutrasthana 2/17, , Published by Chowkhamba Orientalia, Varanasi: 2007, p. 25-26.
7. Charak Samhita, *Ayurveda Dipika Commentary of Chakrapani Datta*, Edited by Vaidya Jadavji Trikamji Acharya, Sutrasthana 2/17, , Published by Chowkhamba Orientalia, Varanasi: 2007, p. 25-26.
8. Prof. P.V. Sharma *Dravyaguna Vijnana (Basic Concepts)*. Chaukhamba Bharti Academy Varanasi, 2013; 1.
9. Yadavji Trikamji Acharya. *Dravyaguna vijnam*. Nagpur: Baidyanath Ayurveda Bhavan Ltd, 1997; 32-29.
10. Kaviraj Atridev Gupta *Asthanga Sangraham*. Krishnadas Academy, Varanasi, 2002.
11. Dr. Bramhananda Tripathi *Sharangdhara Samhita*. Chaukhamba Surbharati Prakashan, 2004.
12. Dr. J.L.N. Sastry, *Dravyaguna Vijnana (Fundamental Principles of Pharmacotherapeutics in Ayurveda)*, Chaukhambha Orientalia Varanasi.