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Review Article On Practical Approach Of *Abhav Pratinidhi Dravya* And Concept Of Substitutes And Adulterants

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ABSTRACT

Ayurveda is a science where number of herbs was explained in classics for various diseases. Although this science has huge classical herbal data, there is a big drawback of the availability of those herbs. For this purpose the Acharyas explained about the concept of *Abhava Pratinidhi Dravyas* (Substitution of drug). The concept of substitution is available in the treatise of *Bhavaprakasha* and *Yogaratnakara* which explains *Pratinidhi* as; when there is unavailability of any particular drug during preparation of a compound, one should try to get another drug having similar potency in terms of *Rasa*, *Guna*, *Veerya*, and *Vipaka*.

In present era, many pharmacies facing difficulties in getting genuinity of the raw herbal drug due to many reasons like deforestation, over exploitation, extinction of many species and incorrect identification of many plant species, which hampers the quality of the formulation which gives rise to the alternative use of substitution and adulteration of herbal raw drug. This paper is an attempt to understand the concept of substitution and adulteration in both classical as well as present era, which will enrich the current practices of *Pratinidhi Dravyas* (Substitute Drugs) in Ayurvedic science.

KEYWORDS: Abhava Pratinidhi dravya, Substitution, Adulteration.

INTRODUCTION The World Health Organization (WHO) report about 4 billion people of the world presently use herbal medicines for their primary health care as alternative system of medicine. Many of the herbal Industries facing shortage of genuine plant due to various problems like over-exploitation, deforestation, loss of habitat etc. Plant resources particularly medicinal plants are disappearing at an alarming rate and not enough attention is being given to seek alternate sources or substitutes for many of these plants. Although scores of medicinal species have vanished from our country or are threatened with extinction, India is blessed with one of the richest floras in the world

and still there are hundreds of species, which have equal value to some of the commonly used plants and may be some of them; even be superior in their properties to those in common use. [1]

For this reason although the demand of medicinal plant is ever increasing but fails to supply with authentic drug giving rise to substitution & sometime irrational adulteration. This paper is an effort in the direction to study this concept of substitution and adulteration in classics (past) and to know about these concepts meticulously in light of modern techniques for its better understanding and application. **Substitution in Ayurveda** Substitution is one of the principles of Ayurveda which is termed as "*Abhava pratinidhi dravya*". In Ayurvedic literature the references regarding substitution will found in many texts. ***Vagbhtaacharya* mentioned in *Shodhanadi Gana sangraha*** Ashtanga Hrudaya 15th chapter, Acharya Vagbhata explains that, if in the *Gana* (group of drug mentioned with specific action), one drug is not available; the other one of the drug from the same *Gana* can be taken in double quantity2. From these it came into picture about the knowledge of *Abhava dravya* was known to our *Acharyas* from *Samhita kala[2]*. Some of the Ayurvedic texts like *Bhavaprakasha, Yogaratnakara, Bhaishajya Ratnavali* between 16-17th AD discussed in detail about the substitutes.

According to *Bhaishajya Ratnavali*

"कदाचित् द्रव्यमेकम् वा योगे यत्र न ऱभते ।

तत् तद्गुणयुक्तम् द्रव्यम् पररवतेन ग्रीयते" ॥भै. र. ४/५७

If in the formulation, one drug is not available then instead of that Dravya physician can take another Dravya which possess similar quality[3, 4]. There are various opinions regarding Abhava pratinidhi Dravyas by different Acharyas are mentioned in Table 1.

Table 1 : Showing number of Abhava Pratinidhi Dravya mentioned by various Acharyas

Bhavaprakasha	**Yogaratnakar**	**Bhaishajya Ratnavali**
61	70	47

- Sthavara Dravya (drugs of plant origin),
- Jangam Dravya (drugs of animal origin),
- Bhoumya Dravya (drugs Minerals-Metals origin) and
- Ahariya Dravya (food materials)

Some examples for Abhava Pratinidhi Dravya for Sthavara dravya (Table 2)

Table 2 : Showing the examples for Sthavara dravya and its Pratinidhi dravyas.

Main dravya	**Abhava Pratinidhi dravya**
Tagara (*Valeriana wallichii* DC.)	*Kushtha* (*Saussrea lappa* C.B. Clarke)
Murva (*Marsdenia tenacissima* W.)	*Jinghini twak* (*Odina woodier* Roxb.)
Varahi kanda (*Dioscorea bulbifera* Linn.)	*Charmakaralu* (*Tacca aspera* Roxb.)
Lakshmana (*Solanum xanthocarpum* Schrad.)	*Mayurashikha* (*Adiantum caudatum* Linn.)
Ahimsra (*Capparis sepiaria)*	*Manakanda* (*Alocasia indica* Roxb.)
Nirgundi (*Vitex negundo* Linn.)	Tulasi (*Ocimum sanctum* Linn.)
Yashtimadhu (*Glycrrhiza glabra* Linn)	*Dhataki* (*Woodfordia floribunda* Salisb)
Punarnava (*Boerhavia diffusa* Linn)	*Rakta punarnava*
Daruharidra (*Berberis aristata* DC.)	*Haridra* (*Curcuma longa* Linn.)
Jatipushpa (*Myristica fragrans* Houtt)	*Lavanga* (*Syzygium aromaticum* Linn)
Bakula (*Mimusops elengi* Linn)	*Kamala* (*Nelumbo nucifera* Roxb.)
Arka dugdha (*Calotropis gigantean* Linn)	*Arka patra swarasa*
Pushkara moola (*Inula racemosa* Hook.)	*Kushtha* (*Saussrea lappa* Clarke)
Chavika / *Gaja pippali* (*Piper chaba* Hount)	*Pippali mula* (*Piper longum* Linn)
Bakuchi (Psoralea corylifolia Linn)	*Prappunnada phala* (*Cassia tora* Linn.)
Bharangi (*Clerodendrum serratum* Spreng)	*Talisapatra* (*Abbies webbiana* Lindl)
Dhanvayasa (*Alhagi camerlorum* Fisch)	*Duralabha* (*Fagonia Arabica* Linn.)

Draksha (*Vitis vinifera* Linn)	*Kashmari phala* (*Gmelina arborea* Linn)
Kashmari phala (*Gmelina arborea* Linn)	*Jatipushpa* (*Myristica fragrans* Houtt)
Draksha & Kashmariphala	*Madhuka* (*Madhuca indica* Var.)
Amlavetasa (*Garcinia pedunculata* Roxb.)	*Chukra* (*Rumex vesicarius* Linn.)
Karpura (*Cinnamomum camphora* Nees)	*Granthi patri* (*Leonotis nepetafolia* Edgw)
Kumkuma (*Crocus sativus* Linn.)	*Kusumbha* (*Carthamus tinctorius* Linn.)
Shrikhanda (*Santalum album* Linn.)	*Karpura* (*Cinnamomum camphora* Nees)
Shrikhanda & Karpura	*Rakta chandana* (*Pterocarpus santalinus* Linn.)
Rakta chandana	*Nava usheera* (Vetiveria zizanoides Linn.)
Ativisha (*Aconitum heterophyllum* Wall)	*Musta* (*Cyperus rotundus* Linn)
Shiva (*Terminalia chebula* Retz)	*Amalaki* (*Emblica offcinalis* Gaertn.)
Nagapushpa (*Mesua ferrea*)	*Padma keshara* (*Nelumbo nucifera* Willd)
Bhallataka (*Semecarpus anacardium* L)	*Rakta chandana* (*Pterocarpus santalinus* Linn.)
Bharangi (*Clerodendrum serratum* Sprng)	*Kantakari moola* (*Solanum xanthocarpum Schrd*)
Guduchi Satva (*Tinospora cordifolia* Thunb)	*Guduchi swarasa*

Substitute for *Ashtavarga*[4] (Table 3)

Table 3) Table 3: Showing Ashtavarga & their substitute Dravya

Main dravya	***Bhavaprakasha***	***Yogaratnakara***	***Bhaishajya ratnavali***
Meda	*Shatavari*	*Shatavari*	*Ashwagandha*
Mahameda			*Anantamoola*
Jeevaka	*Vidari kanda*	*Vidarigandha*	*Guduchi*
Rushabhaka			*Vamsha lochana*
Kakoli	*Ashwagandha*	*Ashwagandha*	*Shatavari*
Ksheera kakoli			
Riddhi	*Varahi kanda*	*Varahi kanda*	*Bala*
Vriddhi			*Mahabala*

Pratinidhi for Jamgama Dravya[3]

 Kasturi (Moschus moshifera Linn.) with Kankola (Piper cubeba Linn.) - Katu-tikta, Tikshna, Sugandha, Ushna, Katu, Kapha-vatahara, Dourgandhya- hara

 Nakha (Helix aspersa O.F.Muller) with Lavanga pushpa (Syzygium aromaticum Linn.) – Katu, Laghu, Ushna, Katu, Kapha-Vatahara.

Pratinidhi for Ahariya Dravyas[4]

Bhaishajya Ratnavali in 4th chapter explains the substitution for Ahara dravya like in the absence of Madhu, Purana guda is used and if Purana guda is not available then Naveena guda is dried under sunlight for 4 Yama and can be used. Both Madhu and Guda are having Madhura rasa, Pittahara, Deepana, Raktaprasadaka. Also in the absence of milk, Mudga or Masura rasa can be used. As the main requirement for an appropriate Pratinidhi Dravya is to possess similar Gunas to that of original drug, the Abhava Pratinidhi dravyas were compared on basis of their Rasapanchaka. It is stated that some of the Dravyas like Ashtavarga, Kumkuma, Shweta chandana were rare even to the rich person also, hence substitutions were suggested which could be within range of wide population from rich to the poor.

Substitutes used not only seems to be always raw but also processed e.g. – Guduchi satva & Guduchi swarasa

***Abhava Pratinidhi* for *Bhauma Dravya[3]* (Table 4)**

Table 4 : Showing *Abhava Pratinidhi Dravya* for *Bhauma dravya*

Bhouma dravyas	***Pratinidhi dravya***
Suvarna rajata bhasma	*Loha*
Loha bhasma	*Mandura*
Mukta	*Shukti*
Vajra	*Varatika*
Suvarna makshika	*Suvarna gairika*

Adulteration in Ayurveda[5]

Adulteration is termed as *Apamishrana* in Ayurveda. In ancient classics some artificially prepared Dravyas lakshana are mentioned:

Karpura lakshanas

Acharya Narahari, Author of Raj Nighantu in Chandanadi varga, explains that, While mentioning Prashastha karpura lakshana author says that, if the karpura is clear, light weight, Tikta rasa Yukta, white, devoid of Sneha then regard as to Shuddha if not it is considered as Krutrima karpura.

Artificial Kasturi lakshana

Acharya Narahari, the author of Raja nighantu in Chandanadi varga says that, artificial Kasturi smells like Dhuma, yellow colored after putting in Payasa, burn immediately in fire, heavy, Ruksha after Mardan.

Limitations explained by Acharyas for substitution

In Bhavaprakasha Samhita purvakhanda 6th chap, it is explained that, in the formulations we should not substitute the main drug. ex. In Kutajarishta – Kutaja (Holarrhena antidysenterica) should not be substituted. Also if in formulation, unsuitable Dravyas - should be discarded by adding suitable one by considering its Rasadi gunas.4 Acharya Govinda Das in his treatise Bhaishajya Ratnavali explains that, If in formulation, one drug is not available then Purvavarti dravya (Previous drug to the respective drug in the formulation) or Paravarti dravya (Next drug to the respective drug in the formulation) with the same property from same yoga if taken then there is no harm3.

Substitution & Adulteration in Present

Substitution in Present

To achieve the desired effect, when one of the *Dravya* in the formulation (due to its unavailability) is substituted with the other *Dravya* which is having similar *Guna (Rasapanchaka)* or similar & proved therapeutic activity called as substitution. But the concept of substitution in Pharmcognosy & herbal science mainly refers it as a part of adulteration where the drug is totally replaced by other drug[6].

Need for Substitution [7]

1. Non-availability of the drug

Soma, Ashtavarga Dravyas

2. Cost of the drug

Kasturi, Keshara, Suvarna, Vajra

3. Geographical distribution of the drug

Eg. *Rasna* source in Northen India - *Plucia lanceolata* whereas in southern parts its *Alpinia galanga*

4. Uncertain identity of the drug

Eg. for the herb *Lakshmana – Ipomea sepiaria, Aralia quinquefolia* etc

5. The adverse reaction of the drug

Eg. *Vasa - Rakta-Pittahara* drug, but due to its Abortificiant activity its utility in pregnant women is limited- *Laksha , Ashoka* etc are substituted. **Examples of Substitution in present**

a. Substitution between totally different drugs: *Bharangi* (*Clerodendron serratum*) & *Kantakari* (*Solanum xanthocarpam*).

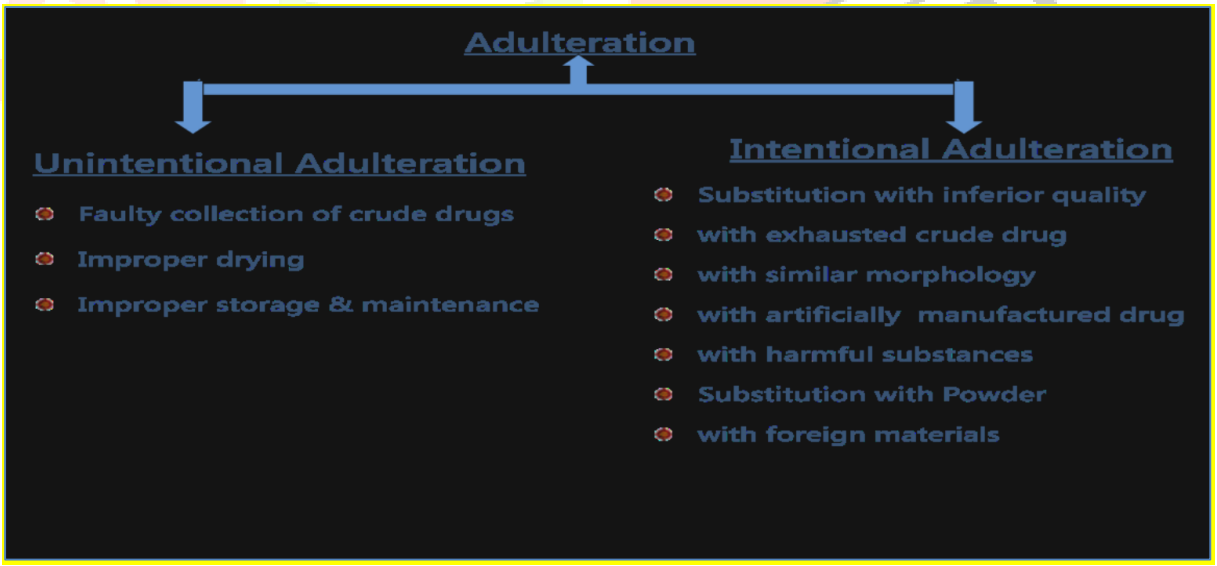
b. Substitution between different species :*Brihat Gokshura* (*Tribulus terrestris*) with *Laghu Gokshura* (*Pedalium murex*).

c. Substitution of the Species Belonging to Same Family: *M. fragrans* with *M. Malbarica.*

d. Substitution with different parts of plants: Root of *Sida cordifolia* with Whole plant of *Sida cordifolia*

Types of Adulteration [6] (Figure 1)

Figure 1: Showing types of Adulteration



Adulteration in Present

An adulteration literally defined as mixing or substituting the original drug material with other spurious, inferior, defective, spoiled, useless other parts of same plant, including harmful substances[7].

Reason for Intentional Adulteration For commercial benefits: In olden days, the nature of human was pure and *Satwik*, but as time passed he became commercialized i.e. money minded and start to concentrate only on benefits. Due to this nature to get more and more benefit from selling herbal drugs, started to add some morphologically similar cheaper inferior drugs.

Reason for Unintentional Adulteration

a. **Lack of Authentic knowledge:** *Vidari - Pueraria tuberosa* and its substitute is *Ipomoea digitata* - an endangered gymnosperm *Cycas circinalis* is sold in plenty as *Vidari.*

b. **Confusion due to similarity in Morphology:** *Mucuna purience – Mucuna utilis* (sold as white variety) and *M. deringiana* (Bigger variety).

c. Careless collection

Types of Unintentional adulteration[8]

1. Faulty Collection of drug: While collecting drug – many similar gymnosperms (Vegetative matter) and other grasses get collected with main drug.

2. Improper drying: Faulty & inadequate drying may also cause adulteration

Digitalis leaves when dried enzyme degrades the glycosides content *Lavanga, Jatiphala* & other oil containing drugs if dried under sunlight then oil content will get evaporate – inactive.

3. Improper storage & maintenance: Improper storage conditions also affect the quality of drug - may leads to spoilage. Eg. Volatile oil should be stored in closed container in dark room, cord liver oil should be stored in amber colour bottles, belladonna leaves should be stored in moisture free containers and ergots should be protected from moulds.

4. Substitution with substandard variety: Adulterants resemble the original crude drug, morphologically, chemically, therapeutically but are sub-standard in nature and cheaper in cost, Pieces of *Strychnous nux- blanda* / *nux- potatorum – S. nux-vomica, Avartaki* leaves added to Indian senna leaves.

5. Substitution with artificially manufactured substance: To provide similar form & appearance, compressed chicory sold as coffee, Paraffin wax made yellow colour and used in place of bee wax, Basswood in place of nutmeg, artificial invert sugar for honey.

6. Substitution with exhausted drug : the same plant material is mixed which is having no active medicinal components as they have already been extracted out.

Most common in case of volatile oil containing materials like clove, fennel etc. Dried exhausted material looks like original drug.

7. Substitution with synthetic chemical: Synthetic chemicals are used to enhance natural character of the exhausted drug. Citral is added to citrus oils like lemon and orange oils.

8. Harmful adulterants: Market wastes, worthless heavy materials, Rodent fecal matter added to Cardamom seeds, Pieces of limestone in Asafoetida, A large mass of stones mixed with Liquorice root, Lead shot in *Ahiphena* (opium seeds)

9. Adulteration with Powders: Powered bark in *Kampillaka*, Ginger powder - exhausted ginger, Powered olive stones in *Yashtimadhu / Maricha churna,* Capsicum powder in red-sandal wood Commonly used Adulterants (Table 6)[6,9] Table 6 : Showing common Apamishrana (adulterants) in day to day use

S. No.	Main drug	Adulterant drug	S. No.	Main drug	Adulterant drug
1.	*Ativisha*	*Shatavari*	11.	*Kankola*	*Gulbakshi Beeja, Papaya beej*
2.	*Ahiphena*	*Krushna Mruttika*	12.	*Kampillaka*	Brick Powder
3.	*Daruharidra*	*Yellow coloured Stem*	13.	*Keshara*	Other flower
4.	*Nagakesharа*	*Surangi*	14.	*Katuki*	*Narikela* in *Tikta rasa kwatha*
5.	*Guggulu*	*Babbula Niryasa*	15.	*Khadira*	Black soil added in *Khadira churna*
6.	*Rakta Chandana*	*Patranga Kashtha*	16.	*Krushna Jeeraka*	*Shweta Jeeraka*
7.	*Hingu*	*Babbula niryasa/* Black soil	17.	*Snuhi ksheera*	Lime Water
8.	*Lavanga*	Exhausted Floral Bud	18.	*Markandika*	*Avartaki Patra*
9.	*Vidanga*	*Kampillaka beeja*	19.	*Ela*	*Kulinjana*

10.	*Maricha*	*Papaya beeja*	20.	*Yashtimad hu*	*Gunja Moola*

Drug and Cosmetic Act: [10] In according to Indian Drugs and cosmetics Act and drug regulatory affaire aspects for ASU, this adulteration mainly considered under three criteria (Table no. 7);

- Misbranded
- Adulterated or Substituted
- Spurious drugs, which are mainly used in any raw herbs along with any polyherbal formulation.

Table 7: Showing Criteria under GMP rule & Punishable act under schedule T

Item	**Section**	**Criteria of GMP Rules & Act under Schedules – T for ASU Drugs**
Misbranded drugs	**33E**	ASU drugs are deemed to be misbranded If coloured or coated to conceal the damage or made better than therapeutic value. If it is not labelled in prescribed manner. If label or container accompanying drug bears any claim or misleading.
Adulterated Drugs	**33EE**	ASU drugs are deemed to be adulterated If it consists filthy or decomposed material. If prepared, packed or stored under insanitary conditions. If its container contains any poisonous or deleterious substance. Colour other than one which is prescribed. Harmful or toxic substances. If any substance mixed to reduce its quality or strength.
Spurious drugs	**33EEA**	ASU drugs are deemed to be spurious. If it is sold or offered under another name. If it is an imitation or substitution for another drug. If the label or container

		bears the name of an individual or company which is factious. □ If it has been substituted by other drug.

Under this section harmful substitution or adulteration became punishable. CONCLUSION Substitution occurs due to unavailability of drug but adulteration is only for increasing commercial profit which may be one of the cause of Adverse drug reaction and which is punishable.

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