ISSN: 2322 - 0902 (P)
ISSN: 2322 - 0910 (O)

International Journal of Ayurveda and Pharma Research

Review Article

RATIONALITY BEHIND AYURVEDA COMPOUND FORMULATIONS- A BIRD'S EYE VIEW

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ABSTRACT

Ayurveda is Indian heritage system of medicine gifted by ancient *Acharya*. It provides scientific approach for dealing human health issues with tools of nature like herbs, minerals, metals etc. It states that every substance in the universe can be applied as medicine with the help of *Yukti* or logical approach of physicians. In present era, whole world is looking towards Ayurveda for its novel natural healing modalities to get relief from their ailments whether physical or mental. Hence here is the need for development of more numbers of Ayurveda formulations to overcome the different health hazard. Moreover invention of more formulations for newly developed diseases like cancer, AIDs, dengue etc. is also needed. But these herbal preparations also face problems like adulteration, non-availability in a particular area or extinction of herbs due to excessive use of a particular herb. On this background present study was undertaken to analyse the fundamental rationality behind Ayurveda formulations mentioned in various ancient transcripts. Literary data regarding evolving a formulation was scrutinized with examples of important formulations mentioned in various texts. This study results out that for developing a particular formulation, factors like availability, palatability, potency, safety, efficacy etc. should be considered.

KEYWORDS: Ayurveda, Ayurveda formulations, herbs, compatibility specifications.

INTRODUCTION

Ayurveda is one of the traditional medicinal systems with an established history of many centuries. *Ayurvedic* medicine is ancient Vedic knowledge which is considered to be one of the oldest healing sciences and has survived until the present generation over many centuries of tradition. Originated in India thousands of years ago, Ayurveda is known as "the science of life," focusing on bringing harmony and balance in all areas of life including mind, body and spirit. *Ayurvedic* medicines are divided into three classes, namely herbal, mineral and animal. The famous & authentic book of Ayurveda "Charak Samhita" states that-

"There is no substance in the universe which can't be used as drug on the condition that they are used rationally and with a definite objective[1]."

For therapeutic application of a *Dravya* (substance) in the real world, the scholar should considered the fact why and where to use that particular drug along with the *Yukti* (rationale) behind the application. Concentration should be given on the dose, time and duration applicable for a particular *Dosha*, *Dushya* (specific pathological condition) and *Prakriti* (constitution) of a subject. These are the prime concerning factor for application of a *Dravya* (substance) in the form of medicine.

Best treatment should be of that type which treats the disease & should not produce other disease or any other complication. Same is applicable to a formulation also it should treat the disease & should not produce any disease or complication[2].

Science of Ayurveda formulation is not different from principle of *Tridosh* (basic principle) *& Shadras* (taste). It starts from *Tridosh* & taken consideration in to status of *Tridosh* in the body & effects of *Shadras* on these *Doshas*, an Ayurveda formulation is decided. *Madhur, Amla, Lavan rasa* pacifies *Vata, Madhur, Tikta, Kashaya ras,* pacifies *Pitta, Katu, Tikta, Kashaya rasa* pacifies *Kapha*. Drugs with these *Rasas* are used in preparing a formulation according to status of *Doshas* in body. *Tridosh* are pacified by those drugs which have opposite characters to *Tridoshas*. e.g. oil, ghee & honey are pacifiers of *Vata, Pitta & Kapha[3].*

Where there is a substance having several *Rasas* or disorders having several *Doshas* one should first critically analyse the role of *rasa* or *Dosha* individually & then decide the effect of the substance or the disorder wholly[3].

But this rule is not applicable universally because in case of disorders where the effect is not exactly in accordance with the cause due to various causative factors operating, mutual subordination & variation in processing, it is not possible to decide the effect of the total drug or disease on the basis of the effect of individual *Rasa* or *Doshas*[3].

In case of such conjunction, the effect of the drug or disease is ascertained on the basis of that of the aggregate[3].

As per fundamental principle of Ayurveda, both the single as well as compound form of drugs possesses not only a single *Rasa* (taste principle) rather a combination of six basic *Rasa* (taste principle). Similar

kind of theory is applicable for a particular disease phenomenon also. In the pathogenesis of a disease, a combined effect of *Dosha* (basic humours) are responsible rather than single involvement of a *Dosha* (humours). Hence ancient scholars of Ayurveda used to conglomerate the single drugs into a formulation for getting a desired effect. But there are also drugs which don't show their effects according to their *Rasas*. In these types of situations, drugs are used according to their effects. e.g. *Pippali* (*Piper longum* Linn.) *& Nagar* (*Zingiber officinale* Roscoe) are of *Katu rasa* but they are *Vata* pacifiers & exhibit *Vrishyakarma* (aphrodisiac) also. So they are used according to their action. It means combined effects of drugs are considered on a particular disease. e.g. *Amrita* (*Tinospora cordifolia* Willd Miers ex Hook f. & Thoms.) has *pitta* pacifying properties but when *Amritarishta* is prepared it pacifies *Vata* & does *Brihangankarma* (strengthening action). On preparing formulation, it leaves its basic function. So here *Amritarishta* is used for *Vatasanshman karma*, *Brihangan karma* & therefore in *Kamala* (Jaundice) & *Pandu* (anaemia). So combined effects of drugs are considered.

Basic criteria & compatibility specifications for formulation development as per classical texts

He is the best among physicians who knows application for external as well as internal actions, combinations & rational administration of these 500 drugs & 50 *Mahakashayas*[4].

About 6 *Aasthapan skandha-dravyas* the wise physician should eliminate the drug if it is not appropriate even if enumerated in the group & should add the appropriate one if it is unmentioned. If situation arises, a group may be combined with another or several other groups based on reasoning[5].

This is actually the basic criteria for developing an Ayurveda formulation & it is the basic principle.

Basic criteria which should be considered while preparing a compound formulation are[6]:

1. Firstly drugs to be used should not be incompatible to each other. Otherwise they may create some harm to the body instead of benefits. 18 incompatibility types according to Charak which should be taken under consideration while deciding compatible & incompatible drugs are:

That which is antagonistic in respect of place, time, *Agni*, dose, suitability, *Doshas*, processing, potency, bowels, health conditions, order, contra-indication, indication, cooking, combination, palatability, richness in properties, rules of eating, is not wholesome for the person[7].

a) Place- if in arid zone, rough & sharp substances, and in marshy region unctuous & cold ones are antagonistic.
b) Time- if one takes rough & cold etc in the winter & pungent, hot etc. in the summer. It is antagonistic.
c) *Agni*- antagonism of food & drinks in four types of *Agni*
d) Dose- honey & ghee in equal quantity are antagonistic.
e) Suitability- use of sweet, cold etc. by a person accustomed to pungent, hot etc. is antagonistic.
f) *Doshas*- use of drug, diet, behaviour similar to *Doshas* in properties but adverse to the person's practice.
g) Processing- when the edible becomes poisonous by particular processing such as in case of peacock's meat attached to the castor sticks.
h) Potency- when *Shitavirya* & *Ushnavirya* substances are combined together.
i) Bowels-when too little, of mild potency & non breaking drug is administered in hard bowels persons; while heavy, breaking, abundant one is administered in soft bowels are antagonistic.
j) Health condition- when *Vata*- vitiating substance is given to the person indulged in over-work, sexual intercourse, exercise and *Kapha* vitiating substance is given to the person indulged in oversleep & laziness are antagonistic.
k) Order- when one takes food before excreting faeces, urine, without appetite or excessive hunger.
l) Indication & contra-indication- if hot things are taken after intake of pork etc. or cold things are taken after intake of ghee.
m) Cooking- if grains are uncooked, over-cooked or burnt.
n) Combination- sour things taken with milk.
o) Palatability- taking of unliked things.
p) Richness of qualities- if there is immature, over mature or damaged rasa in a substance.
q) Rules- if food is not taken in privacy etc.

2. ***Karma Viruddha* (Action incompatibility):** While selecting drugs for a disease, care should be taken that they are not of opposite actions. If they are to be used then they should be added in that ratio that they only produce desirable effects & no side effects. e.g. excessive amount of arsenic with *Guggulu* (*Commiphora mukul* (Hook ex Stocks) Engl.) is contra indicated as it causes scrapping of body by increasing roughness & dryness in body & aggravates *Vata* instead of pacifying it.
3. ***Sanskar*:** It is done to produce special effects in a drug. e.g. purification of *Parad* (mercury) & *Gandhak* (Sulphur) is done to remove their toxic effects & then *Siddha makardhwaj* is prepared by *Kupipakvarasayan* method.
4. ***Yojna* (plan) :** That method which removes the bad effects & produce the desirable effects. E.g. While using *nishoth* (*Operculina turpenthum* Linn.), *Shunthi (Zingiber officinale* Roscoe) is also used to remove tenesmus produced by *Nishoth*.
5. ***Samyog*:** mixing of drugs to prepare a formulation. It is done to produce specific features in a formulation like-
   a. To remove side effects of a drug- side effect of *Indrayan (Citrulus colocynthis* Schrad) is tenesmus therefore *Shunthi* is used along with it.
   b. To produce synergistic effects- to increase emetic effects of *Madanphala (Randia dumetorum* Lam.), *Jimutak (Luffa echinata* Roxb.) juice is used as a *Bhavnadravya.*

c. To produce a limited check on speedy effects of drugs- mixing of honey & ghee. For this purpose *Pichchhil, Snigdha, Manda* drugs are used.

d. To act as catalyst-to increase the diuretic action of *Badarpashan*, decoction of *Panchtrina* is used along with it.

e. To act as preservatives- e.g. sodium benzoate, salt etc.

f. To produce desirable taste, smell & colour or to make it heavy. e.g. due to black colour & weird taste of *Aaragvadha (Cassia fistula* Linn.), sugar & honey is mixed. To produce good smell, *Karpura (Cinamomum camphora* Nees & Eberm.), mentholetc is added in formulations.

g. To produce some other desirable effects.

6. Place & time: patient belongs to which place, which type of *Rasas* are compatible to him etc. should be taken care of. Season, *Ritu* etc. a drug should be used with a specific drug to have good effects according to season. eg. before meal, after meal, *Rituharitki, Ritutrivritta sevan*. etc. *Hingvashtak churna* is taken in mid of meal because of *Samanvayuvikriti*.

7. *Upyogsanstha* (rules of using a drug) : e.g. their *Anupan* etc. *Anupan* helps in easy & quick dispersion of drug in body & increases its bioavailability also. There are some examples of formulations & their vehicles prepared & used according to status of *Doshas* & diseases.

e.g. These drugs (*Madanphala*) should be administered with vehicles according to *Dosh*, in *Vata* aggravation, wine, *Sauvirak, Tushodak, Maireya, Medaka, Dhanyamla, Phalamla* (different forms of liquor), sour curd should be used with drugs. Grapes, gooseberry, honey, milk etc. in *Pitta* & in *Kapha*, impregnated with or dissolved in honey, urine, decoction etc[8].

Sweet ball prepared of sugar, *Triphala* (combination of *Terminalia chebula* Retz., *Terminalia bellarica* roxb., *Emblica officinalis* Gaertn.), *Trivritta (Operculina turpenthum* Linn.), *Pippali (Piper longum* Linn.), honey alleviates *Sannipata*, upward internal haemorrhage & fever. Powder of *Trivritta, Triphala, Vidang (Embelia ribes* Burm.f.), *Pippali, Yavakshar*- all mixed together taken with ghee or honey or should be made as sweet balls with jaggery. It alleviates *Gulma*, splenomegaly, dyspnoea, *Halimak*, anorexia & other disorders caused by *Kapha & Vata*[9].

8. To protect the basic effects & characteristics of major drug: acidity of acid, basicity of a base, smoothness of ghee & oil etc. if a base is to be added in a formulation then its amount should be considered. As more amounts may suppress the effects of acid.

9. Posology or doses: before deciding dose following factors should be considered (*Das vidha rog pariksha*) – like *Dushya (Dhatu & Mala*), place, strength, time, *Agni*, constitution, age, psyche, suitability, diet, *Avstha* (status of body) [10].

Mahrishi Kashyap gives so much importance to dose that he says it is the root of treatment. e.g. of doses according to Acharya Kashyap at different ages, dose of *Basti* according to age etc. quantity of *ghee* at different stages of age. To a neonate, ghee is given in one *Vidangpraman*. Then in every month, one *Vidang* is increased upto 12 *Vidang* or 2 *Ratti* etc.

Dose of *Swaras* is half *Pala*, decoction is Pala, Kalka is one *Karsha*, dose of *Yograjguggulu* is *Udumbersam*, *Dhatriavaleha* & *Muktaaadichurna* is one *Panitala*. These all doses are medium doses which are suitable after *Tarunavastha* (After 20-25 years of age).

according to modern, following factors should be considered- age, sex, size & weight of body, constitution, tolerance, mental condition, status of disease, climate, fasting condition, time of administration, rate of absorption. These are more or less similar to Ayurveda.

Symptoms of properly made formulation:

The drug administered in proper dose is that which in small dose exerts great force & eliminates plentiful impurity, is easy, light in digestion, good in taste, saturating, alleviates disease, even in faulty application does not harm, does not cause much depression & is endowed with good smell, colour & taste[11].

Narayan churna

The most famous Ayurveda formulation for *udar rog* is *Narayan churna*. It contains *Yavani (Carum copticum* Benth & Hook.), *Hapush (Adiantum lunulatum* Burm.), *Dhanya (Coriandrum sativum* Linn.), *Triphala* (combination of *Terminalia chebula* Retz., *Terminalia bellarica* roxb., *Emblica officinalis* Gaertn.), *Upkunchika (Nigella sativa* Linn.), *Karvi, Pippalimula (*root of *Piper longum* Linn.), *Ajgandha, Shati (Hedychium spicatum* Ham. Ex Smith), *Vacha (Acorus calamus* Linn.), *Shatavha (Anethumsowa* Kurz.), *Jeerak (Cuminum cyminum* Linn.), *Vyosh* (combination of *Zingiber officinale* Roscoe, *Piper longum* Linn., *Piper nigrum* Linn.), *Swarnaksheeri (Argemone Mexicana* Linn.), *Chitrak (Plumbagozeylanica* Linn.), *Yavkshar* (impure carbonate of potash), *Pushkarmula (Inular acemosa* Hook.f.), *Kushth (Saussurea lappa* C.B. Clarke), five types of salt, *Vidang (Embelia ribes* Burm.f.), *Danti (Baliospermum montanum* Muell.-Arg.), *Vishala (Trichosanthes palmata* Roxb.), *Saptala* (*Acacia concina* DC.) [12].

Best indicated for *Virechankarma* (purgation) in *Udar rog*. For this purpose- *Danti, Saptala, Trivritta* are used as major drastic & irritant purgative drugs. *Triphla, Svrnakshiri, Chitrak* are *Mal bhedak* (stool softeners). *Lavanpanchak & Kshar* act as osmotic purgatives. They all produce synergistic effects here. To have desired rate of this purgation, some *Grahi* (anti-diarrhoel) drugs are also added like *Hapusha, Dhanyak, Jeerak*. To prevent side effects like tenesmus, *Upkunchika*, *Pippali* are added. Rest drugs are used to treat the root cause of disease for *Aampachan karma*, *Deepan karma* etc. Specific *Anupan* (adjuvants) is also depicted for particular diseases. These particular drugs here may act as catalyst or to enhance the potency of this formulation for that particular disease. To use this formulation *Snigdhakoshtha* (smooth bowel) is indicated to facilitate easy downward movement of faeces which is done with *Sar* property of *Sneha (ghee* etc.).

Vasaavleha

It is prepared with juice of *Vasa* (*Adhatoda vasica* Nees), *Sita, pippali (Piper longum* Linn.), *Goghrita* & honey

used in *Rajyakshama, Pattikkasa, Rakta pitta* etc[13]. *Tikta rasa & Rukshaguna* of *Vasa* aggravates *Vata*, to pacify it, *ghee* roasted *Pippali* is added in it. *Pippali* is also used to enhance the effect of *Vasa*. *Ghrita* is used to prepare its *Avleha*. Sugar & honey is used to make it tasty & for *Avleha* property.

Kaanchnar guggulu

Triphala (combination of *Terminalia chebula* Retz., *Terminalia bellarica* roxb., *Emblica officinalis* Gaertn.), *trijata* (combination of *Elattaria cardamomum* Maton., *Cinnamomum zeylanicum* Blume, *Cinnamomum tamala* Nees & Eberm), *Trikatu* (combination of *Zingiber officinale* Roscoe, *Piper longum* Linn., *Piper nigrum* Linn.), *Guggulu* (*Commiphora mukul* Hook ex. Stocks*)* Holmes), stem bark of *Varun* (*Crataevanurvala* Buch.-Ham.) & *Kaanchnar* (*Bauhinia variegata* Linn.) are ingredients, used for *Gandmala*, *Apachi*, *Arbuda*, *Gulma* etc[14]. In this preparation, *Kaanchnar* is major ingredient and *Guggulu & Varun* bark have synergistic effects. *Triphala* is added for pacifying *Kapha pitta & Agnimandya* & because of its *Bhedankarma*, it also enhances the effects of *Kaanchnar*. Similarly *Trikatu* also enhances its effects. *Guggulu* acts as binding agent to prepare its *Vati*. *Trijata* is added to bring *Kapha* in its natural state. It also performs preventive & curative role for infectious conditions of *Gandmala*. *Trijata* specifically acts on upper part of body. *Gandmala* is an upper body disease. Therefore it is added to perform multiple actions.

These factors also influence their pharmacological activity. Researchers are being done to prove this also.

Influence of season and place of collection

Branches & leaves should be collected in rainy & spring season, roots in summer or in late winter when the leaves have fallen down or are fully matured, bark, tubers, latex in autumn, heartwood in early winter & flowers & fruits according to their season[15].

Time of collection of plant material is clearly indicated, in that time period, they give significant results. In one of the studies it has been shown that season of collection of raw drugs can influence the expression of pharmacological activity[16].

Paarijaata (*Nyctanthes arbor-tristis* Linn) leaves collected in different seasons (six samples) were subjected to pharmacological evaluation. It was observed that samples collected during September produced better anti-inflammatory activity in comparison to samples collected during other seasons. The leaves collected during November and July was almost inactive. In a study carried out by[17], *Silajatu* (a rock exudate) samples obtained from five different places were evaluated for different types of pharmacological activities. Differences in the activity profile were observed. Anti-depressant activity evaluation employing behavioral 'despair' test showed that among the five samples studied only Nepal and Gopeshwar samples showed significant activity while in other samples the activity was not significant[18].

Influence of formulation type

In a study carried out by[18] - *Yastimadhu (Glycyrrhiza glabra* Linn) was administered in three formulation forms and subjected to comparative evaluation. *Yashti churna, Yashtighrita* and *Yashti Sharkaraa*- each containing same quantity of the *Yashti* were evaluated for anti-ulcer activity against forced swimming induced stress ulcers. Significant decrease in ulcer index was observed in *Yashtighrita* administered group; in other two groups only moderate and statistically non-significant decrease was observed. This clearly indicates that for attenuating the stress ulcers test drug given in the form of *Ghrita* is good[19].

Influence of drug processing during preparation

A study carried out by[19] on A-*Pancatiktaghrita* involved preparation of the formulation by three methods and subjecting them to comparative study. The samples were: A-*Panc**a**tiktaghrita* (PG-A) prepared after *Ghrita murchanaa* and using *Triphalakalka*; PG-B prepared by using *Ghrita* subjected to *Murchanaa* without *Kalka*; PG-C prepared only with plain *Ghrita* without subjecting it to *Murchanaa* and without using *Kalka*. Samples B and C produced significant potentiation of anti-body formation against Sheep Red Blood Cells (SRBC) in rats, whereas Sample-A produced only a weak and non-significant effect[20]. This indicates drug preparation and processing methods can influence expression of pharmacological activity.

Influence of adjuvant on the pharmacological activity

A study was carried out[20] by noting the effect of the test preparations on cyclophosphamide induced immuno and myelosuppression. The test drug *Vacaadhaatryaadi Avaleha* (VDAV) containing *Vachaa* (*Acorus calamus* Linn.), *Dhatri* (*Emblica officinalis* Gaertn), *Musta* (*Cyperus rotundus* Linn), *Pushkaramoola* (*Inula racemosa* Hook.f.), *Jeeraka* (*Cuminum cyminum* L.), *Sankhapushpi* (*Convolvulus pluricaulis* Chois.), *Pippali* (*Piper longum* Linn), *Sita* (sugar), *Kshaudra* (honey), *Sarpi* (ghee) and *Trikatu* was evaluated for immunopotentiation effect at the dose of 900mg/kg. As one of the control group *Avaleha* prepared with *ghee*, honey and *Sharkaraa* (1:2:4) (ADJ) - 900mg/kg was used. The observed effect was compared against a water control group. Administration of cyclophosphamide caused significant suppression in anti-body formation. This immunosuppressant activity was reversed by both VDAV and ADJ. However, only the effect observed with VDAV was found to be statistically significant. The myelosuppression produced by the toxicant was also reversed by both ADJ groups and VDAV[21]. The results obtained indicate in many cases adjuvant used may not be inert but *per se* may produce significant pharmacological activities. The above illustrations are just few examples of a vast array of factors that may influence expression of pharmacological activity. Use of cultivated raw material or naturally collected material, processing methods like *Murchanaa, Sodhana, Avartana*, number of *Putas* (method of heating) while preparing a *Bhasma* all have influence over expression of pharmacological activity.

Basis of nomenclature of a formulation

- **First user:** e.g. *Chyawanprash*
- **Major ingredient:** *Dhatriavleha, Dadimaadighrita, Ashwagandhaavleha, Kumariasav, Maharasnaadikvath.*

- **Creator:** *Ardhnarishwarras* created by lord Shiva, Vishnu tail- created by lord Vishnu, *Dhanvantarghrita*.- by lord Dhanvantri.
- **Creator & Major ingredient:** *Agastya haritki*, *Sayambhuvguggulu- guggulu* is major ingredient & *Sayambhuv* is name of lord Brahma.
- **Time of its preparation:** Pushyanugchurna prepared in *Pushyanugnakshtra.*
- **Specific effects:** *Phalaghrita- Santanotpatti* result, *Mritasanjivanagad.*
- ***Upma*:** *Sudarshanchurna*- relieves the diseases just like lord Krishna's *Sudarshan chakra*, *Narayan churna*- as lord Vishnu takes all the sins of persons just like that *Narayan churna* relieves group of diseases, *Mahanarayan tail*- prepared by lord *Narayana* for treating bone fractures during war between lords & devils.
- **Based on morphology:** *Rasa parpati*
- **Based on dosage:** *Shatpalghrita*, *Ksheershatpalshrita*, shad *Bindu tail.*
- **Based on number of contents:** *Tryodashangguggulu*, *Dashanglepa*, *Dadimashtakchurna*, *Hingvashtakchurna*, *Navayaslauh, Panchgavyaghrita.*
- **Based on their effect on that diseases:** *Shotharilauh*, *Amlapittantaklauh, Ajirnakantakras, Krimighnigutika, Aamvatariras, Smritisagarras.*
- **Based on processing:** *Shatdhautghrita*, *Shatputi-abhrak bhasma*, *Putpakva vishamjwarantaklauh.*

Chronological level of research in drug formulation

From Samhita period, researches were done according to the concept of disease & their treatments. Drugs were added or deleted from the formulation without taking caution of its taste, storage, shelf life etc. now time has changed. Many drugs are added or removed keeping in mind of their taste, palatability, storage, shelf life etc. Drugs are replaced depending on their availability in that area or with their substitutes. Sometimes drugs are also altered if they are controversial drugs. A few examples are:

- ***Chyanwanprash*:** Aachrya charak used only five drugs of *Ashtvarga* while preparing it[21]. But at later times, in Sharangdhar Samhita, Sharangdhar started using seven drugs of ashtavarga[22]. It may be due to with time, immunity of people might had gone down, so to provide them better immunity two more drugs were added in it. Otherwise all ingredients are same till now. But in place of *Ashtvarga*, their substitutes are being used today because of their unavailability in the market. Amount of sugar, honey & ghee are also different today to make it more palatable & tastier. Presently mango flavours, orange flavours are also available in a tastier form.
- ***Rajpravartinivati*:** According to *Bhaishjyaratnavali*, it is prepared with *Kasis, tankan, Hingu & Ghritakumari* (*Aloe vera* Tourn.ex Linn.) [23]. But now, all ingredients are altered with seeds of soya, carrot, *Ulatkambal*, bamboo root along with previous drugs to get better results & to avoid any complication.
- ***Chandraprabhavati*:** In this formulation, *Chandraprabha* is a controversial drug. Different writers take it a different drug according to their open-mindedness & availability in their area. Aadhmal in his *Deepika* commentary on Sharangdhar Samhita takes *Kapur & Shati (Hydichium spicatum* Buch. Ham) in the name of *Chandraprabha*. In *Gudharthdeepika*, it is a *Kapur* variety. In *Vaidyakshabda Sindhu,* it is *Bakuchi (Psoralia corylifolia* Linn.) or *Kachur*. In Rasendrasar sangrah, it is *shati*[24]. In the present era, it is taken as *shati*. Writer of *Ayurveda sarsangrah* takes it *Kapur kachari*[25]. *Rastantrasar & Siddha prayogsangrah* take *Kapur* in the name of *Chandraprabha*[26]. In *Bhaishjya-ratnavali*, three types of *Chandraprabhavati* are mentioned, one for *Arsh* & two for *Prameha rog*. For *Prameha, Kapur* is used in the name of *Chandraprabha* along with coriander, sugar & *Trivritta*. For getting the anticipated effect in *Arsh, Kachur*is used in the name of *chandraprabha*[27].
- ***Prasirini tail*:** It is used to pacify *vatic* disorders. *Prasarini* is also a controversial drug. In south, this oil is prepared with *Merremia tridentata* (L.) Hellifer f. In Rajasthan type xerophytic area, *Khinp (Leptadenia pyrotechnica W. & A.)* is taken in the name of *Prasarini*. *Khinp* is used to prepare this formulation. Both *Merremia tridentata* (L.) Hellifer f. & *Khinp* have same action i.e. *Vata* pacifying property. By way of both drugs, this oil gives results.
- Similarly, in the name of *Rasna, Kulinjan (Alpinia galanga* Willd.) is used in south. & in north, original *Rasna* i.e. *Pluchea lanceolata* Oliver & Hiern. is used. So in all preparations of *Rasna, Kulinjan* is used.
- New type of diseases with totally different symptoms is also evolving at this time. So many new formulations are prepared depending on their action in classics & applying logic. E.g. *Maharishi Amritkalash (Terminalia chebula* Retz.*, Emblica officinalis* Gaertn.*, Elettaria cardamomum* Maton*, Cyperus rotundus* Linn.*, Curcuma longa* Linn.*, Piper longum* Linn.*, Santalum album* Linn.*, Cyperus scariosus* Linn.*, Mesua ferrea* Linn.*, Convolvulus pluricaulis* Chois*, Glycyrrhiza glabra Linn., Embelia ribes* Burm.f.*, Centella asiatica* Linn.*,* ghee, honey and sugar*)* to fight chemo-radiotherapy induced toxicity in cancer patients[28].

  For modifying ingredient of a formulation to make it more suitable for the purpose of therapeutic uses, factor should be considered for the desired & better pharmacological action. There is no harm in modifying the classical formulations according to taste, palatability & stability.

Status of drug formulations in current era

In the present era, many formulations are available in the market, which are not as per classical texts but are physician's personal experience based or prepared on logic of combinations. But irony is that all preparations don't give satisfactory results. Main problem is non-availability of exact classical drugs in the market. Adulterants are sold in the name of original drugs. Some drugs are rare, in place of them, some other materials are being provided in the market. Some costly drugs are not added in the formulation but their name is indicated on the labels. One of the commonest preparations which don't

give proper result is *Sitopladichurna. Vanshlochan* is added in this preparation. But in the market, in place of original *Vanshlochan* which is collected from bamboo, chemically prepared *Vanshlochan* is being provided which does not have said properties. Chemically prepared *Vanshlochan* is added in the preparation which doesn't give results. Same happened with *Avipattikar churna*, it is used for *Sukhvirechan karma* (purgation). *Avipattikar churna* available in the market does not give satisfactory results. Reason is *Trivritta (Operculina turpenthum* Linn. Muell-Arg.), which is major ingredient of this formulation is now a threatened plant. In place of it, *Murva (Marsdenia tenacissima* W. & A.) is being sold in the name of *Trivritta* in the market which is used in formulations & doesn't give results. Same happens with *Shilajitu* (*Asphaltum pujabinum*) & *Rasanjan* (prepared from decoctions of *Berberis aristata* DC.) preparations. Second problem arises with the preparation of classical formulations. If exact classical methods & proper procedures are not followed, those formulations do not give proper results. According to Sharandhar Samhita, while doing *Ksheerpak*, drugs, milk, water should be mixed in 1:8:32 ratio[29], when it is disturbed their results also get disturbed.

But there are some patent drug formulations & standard pharmacies, which are using authentic drugs with proper purifying procedures & with classical methods, they give good results also.

Principles & factors used in contemporary *Yoga Vigyan*

Initially five dosage forms *Swaras, Kalka*, *Kwath, Hima*, *Phanta* were formulated. They were of short shelf life. To increase shelf life of the drug, the preparations with more stability like *Vati, Taila, Ghrita* were introduced. Some preparations with food articles fortified with medicines like *Lehya* were also made to have the acceptability of sensitive patients having aversion to medicines. Other commonly used forms *Arechurna*, *Arka*, *Kshar*, *Aasav-Arishta*, *Parpati*. The details of dietetic preparations such as various types of gruels, soup are also available. Ointment, creams, liniment, syrup, granules, capsules, candy etc formulations are also available in market. In preparing these formulations, some additives are also added which are:

Excipients: these are inert substances which don't have any therapeutic efficacy but are used in preparing a formulation.

Uses of excipients: to increase stability, for preservation & storage, maintain bioavailability, for compounding & dispensing.

Granules are the first stage of tablet formulation formed with additives & water.

In Tablets: additives- magnesium stearate, talcum powder, binding agent like *Guggulu*, guar gum, acacia gum.

Use of additives in tablet-

- Escalates the flow property which brings uniformity in tablet.
- For dissolution & maintaining the disintegration time-tablet will get disintegrated & dissolute in a specific time. E.g. disintegration time of *Guggulu* is very high, it passes from the GI tact as such without producing any effect. Additives controls this time according to need of body.
- Friability & hardness- to save tablets from breaking like while transportation. Additives provide definite hardness to tablets which protects them bad handling even.
- Coating agents- To make formulations more palatable, tasty & to protect them from oxidation. E.g. sugar coating & film coating is used.

In Syrup: Following ingredients are supplementary along with drugs.

- Coloring agent- food grade colours are used.
- pH regulator- to maintain acidic pH, citric acid is used for this purpose.
- Dilutant- sugar solution, glucose solution.
- Preservative- neprazine, nepasole, sodium benzoate.
- Flavouring agent- rose, fennel.

In capsule: no additives only capsule shells are used made up of soft or hard gelatin or veggie cap to hold powder material & saves from oxidation.

In ointment/cream: additives- stearic acid, cetyl alcohol, bees wax, soft, hard, liquid paraffin, water, coconut oil, triethyllomine, colorant, flavouring agent like *Karpura* & preservatives.

In *Avaleha* : flavouring agents & preservatives.

Modern view about Ayurveda drug formulation

The form of drugs which ultimately comes into use by the patient is termed as a drug delivery system or drug dosage form. Safety, Efficacy, Stability and Palatability are the four basic requirements of a good drug dosage form. The pharmaceutical procedures for any drug involve various steps starting from identification & collection of authentic raw material, application of standardized processing, techniques & production of quality drug, to packaging & storage of finished drug. Drug formulation in *Ayurveda* is based on two principles: Use as a single drug and use of more than one drug, in which the latter is known as Poly Herbal Formulation. This key Ayurveda therapeutic herbal strategy exploits the combining of several medicinal herbs to achieve extra therapeutic effectiveness, usually known as polypharmacy or polyherbalism.

Even though the active phytochemical constituents of individual plants have been well established, they usually present in minute amount and always, they are insufficient to achieve the desirable therapeutic effects. For this, scientific studies have revealed that these plants of varying potency when combined may theoretically produce a greater result, as compared to individual use of the plant and also the sum of their individual effect. This phenomenon of positive herb-herb interaction is known as synergism. Certain pharmacological actions of active constituents of herbals are significant only when potentiated by that of other plants, but not evident when used alone.

Based on the nature of the interaction, there are two mechanisms on how synergism acts (i.e., pharmacodynamics and pharmacokinetic) [30]. In terms of

pharmacokinetic synergism, the ability of herb to facilitate the absorption, distribution, metabolism and elimination of the other herbs is focused. Pharmacodynamic synergism on the other hand, studies the synergistic effect when active constituents with similar therapeutic activity are targeted to a similar receptor or physiological system. Other than that, it is believed that multiplicity of factors and complications cause diseases in most of the cases, leading to both visible and invisible symptoms. Here, combination of herbals may act on multiple targets at the same time to provide a thorough relief[31].

CONCLUSION

After proper reviewing of classical texts, it can be concluded that in an Ayurveda formulation, there can be a single drug or more drugs in a formulation. While drug development, one or two drugs are major drugs which performs main action for a particular disease. Some drugs are mixed to get synergistic effects. Some drugs are added to reduce adverse effects. Many drugs are added to get colour, flavour for better palatability & to get a specific dosage form. Sometimes drugs are also given with some adjuvants to surge effects & increasing bioavailability. According to modern pharmaceutics, some drugs are also added in Ayurveda formulations to increase bioequivalence for avoiding batch to batch variations, to reduce dose size & minimize quantity of excipients. This is generally done for increasing pharmacokinetic profile of a formulation to get faster onset of actions. To formulate a new compound, these all factors should be considered.

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Cite this article as:
Saini Malvika, Chaudhary Anubha, Garg Naveen, Jaiswal Mohan Lal, Kotecha Mita. Rationality Behind Ayurveda Compound Formulations- A Bird's Eye View. International Journal of Ayurveda and Pharma Research. 2016;4(9):44-51.

Source of support: Nil, Conflict of interest: None Declared

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