



A Critical Review on Concept of Adjuvant

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Introduction: The concepts of *Ayurveda* are unique when considered it in terms of treatment of diseases as well as preventive care in healthy persons. '*Anupana*' is one among them, which is practiced with medicine and food. It helps in fast spreading, quick absorbing of medicine and food in the body. By changing the *Anupana* of one drug, it can be used in different diseases, which makes it unique. In order to drag attention of researchers to this unexplored topic, critical review has been prepared to highlight it in different features.

Methods: References were sought in Pub Med, AYUSH research portal, DHARA online and Google Scholar by utilizing all key words and MeSh terminologies along with *Ayurveda* textbooks. Based on PRISMA guideline, 06 full text articles were included in this study. Clinical studies were also found where *Anupana* was used as modality for management.

Discussion: Present systematic review put the light on the different aspects of *Anupana* as a theoretically and clinically proven novel concept to enhance the efficacy of formulation or drug

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quickly. *Anupana* facilitates the action of pharmacokinetics as well as pharmacodynamics.

Conclusion: *Anupana* has multi-dimensional benefits, including nutritional, stimulating, preventative, and curative properties. An appropriate *Anupana* should be chosen that is suitable for us in order to receive all of the benefits from its intake. Hence it can be concluded that *Anupana* concept is an integral aspect of Ayurveda and a blessing to human beings in terms of health.

Keywords: *Anupana*; Ayurveda; bioavailability; bio-enhancer; pharmacokinetics; pharmacodynamics; PRISMA guidelines.

1. INTRODUCTION

Ayurveda is considered as one of the oldest sciences of life. It is having many unique concepts, which play an important role in treatment and makes it unique one among all other systems of medicine.

One such concept is '*Anupana*' means a substance, which is taken along with food or medicine. *Anupana* is having synonym like *vahana* (vehicle which carries), *madhyama* (media) etc. This can be used as a vehicle for the drug, to increase the palatability and making the drug more potentiate one. Based on different diseases, *Prakruti* (body constituent) of a person and nature of the medicine, different *Anupana dravya* are being advised. Based upon the density or consistency of a drug or formulation, it may be solid or liquid.

Many *Anupana dravya* are being described in *Ayurveda* in different context. Action of a herb can be changed by switching *Anupana* on different diseases for e.g *Triphala* (combination of three fruits *Terminalia chebula* Retz., *Terminalia bellerica* Roxb., *Emblical officinalis* Gaertn.) can be given along with warm water in constipation, in diabetes with turmeric and in splenomegaly with *Pippali* (*Piper longum* Linn.). Other example like *Narayana churna* (poly herbal formulation) is indicated with different *Anupana* for different diseases like in abdominal disease along with *takra* (butter milk), *Badara kashaya* (decoction of *Zizyphus jujuba* Lam.) in *Gulma* (tumor), *suramadya* (alcoholic preparation of a kind of rice) for *vibandha* (constipation) and *usnaambu* (luke warm water) for *Ajirna* (indigestion) are described in *Bhaisajya Ratnavali* [1]. Apart from this, many other *Anupana* have been mentioned like cow urine, ghee, honey, rain water, long pepper fruit, Ginger, Sugar, rock salt, jaggery, milk, meat juice, pomegranate juice etc. It also plays a very good role in ethical clinical practices [2]. In this review the main focus is to throw a light on this

exclusive concept of *Anupana*, which will attract the new researchers to work on it.

2. MATERIALS AND METHODS

2.1 Literature Search Strategy

A systematic search was conducted on the articles published in database including PubMed, AYUSH Research portal, DHARA online and Google scholar using key words like *Anupana*, *Ayurveda*, Bioavailability and Bio-enhancer. Authors also searched *Ayurveda* textbooks such as *Charak Samhita*, *Sushruta Samhita*, *Sharangadhara Samhita*, *Yogaratanakara*, *Raj Nighantu* and other published books of *Ayurveda* compendia.

2.2 Inclusion and Exclusion Criteria

The study is focused on *Anupana*, an inimitable concept of *Ayurveda* used for treatment, medical administration, day-to-day food habits etc. In order to be included, the articles must have key words *Anupana* and *Ayurveda* published in English language, irrespective of journal, author, year etc. Articles published until May 2021 were included. All the articles collected from online database were compiled and screened. We have excluded the contents from letters, meeting abstracts, conference proceedings. Some articles have been excluded due to inappropriateness for following reasons; 1) Not related to topic, 2) Unavailability of abstract or full text. In the next stage, qualification of each article was assessed by reading the abstract and full text. Those articles satisfied for all the inclusion criteria were only included and rest all were excluded.

2.3 Observation

As per availability, final selected articles were screened by reading full text or abstract and were analyzed further. The preferred reporting items of systematic review and meta-analysis

(PRISMA) guideline were followed while conducting this systematic review [3].

Following a systematic search, we mainly focused on *Anupana* and *Ayurveda* key words and retrieved 1520, 4, 3 and 4 articles from Google scholar, AYUSH portal, DHARA online and PubMed respectively. Thus, 1531 potentially relevant records using keyword related to topic of interest were found. Subsequently after removing duplicate records, the titles and abstracts of remaining articles were screened for eligibility leading to extraction process. Finally, 06 articles were included for this systematic review on *Anupana*.

2.3.1 Nirukti

'Anu' upasarga, 'Pa' dhatu and 'Lyut' pratyaya combinely forms the word *Anupana*. 'Anu' means along with, after or near to and 'Pana' means drink [4].

2.3.2 Paribhasha/Definition

Anupana is a substance which is taken immediately after or with medicine or food which simultaneously enhance the property of it [5]. It is a substance, which is taken at appropriate time with specification [6].

2.3.3 Paryaya/Synonyms

Different terms are being mentioned as synonyms of *Anupana* such as 'Vahana' which means one which carries, 'Sahayogi' means the one which brings together, 'Maadhyama' means one which act as media, 'Anutarsha' means one which is beneficial for thirst, 'Anupeya' means one which is taken along with or after food, 'Anupanaeeya' means one which is taken along with food, 'Oushadanga peya' means the *peya* which is used along with medicines [7].

2.3.4 Lakshana of *Anupana* (Characteristics)

Anupana should possess the properties opposite to the food that is taken but it should not produce any harmful effect to the body elements [8].

2.3.5 Classification of *Anupana*

Anupana can be classified based on its usage like *Aaharaupayogi* and *Aushadhaupayogi*. *Aaharaupayogi* means which administered with food items and *Aushadhaupayogi* means which administered with drugs [9].

Based on the form of *Anupana* it can be classified as *Drava* and *Sushka*. 'Drava' which is liquid in nature for example *Jala*, *Dugdha* etc. and 'Sushka' which is solid in nature for example *Sharkara*, *Shita* etc [10,11].

2.3.6 *Anupana Dravya*

- I. **Shreshta *Anupana* (Best adjuvant):-**
Acharya Sushruta has considered *Mahendra jala* (Rain water) as best *Anupana dravya* in all types of liquid. According to *Acharya Vagbhatta*, *Jala* (water) is the best because it is the chief source of all *Rasas* (tastes), it is habituated to all living beings, and it possesses the properties of sustaining life [12].
- II. **Commonly used *Anupana*:-**
There are Some *Anupana* which are commonly used, such as *Sheeta Jala* (Cold water), *Ushna Jala* (Hot water), *Asava* (Fermented liquid medicine), *Madya* (alcoholic preparation), *Yusha*, *Phalamla* (Alcohol prepared from fruits), *Dhanyamla* (alcohol prepared from grains), *Mamsa rasa* (Meat soup) and *Ksheera* (milk) [13].
- III. ***Anukta Anupana*:-**
Madhu (honey) or *Jala* (water) has to be considered as *Anukta anupana* (not specific) means if in classical texts specific *Anupana* is not mentioned to follow then this *Anukta Anupana dravya* has to be considered in general [14].

2.3.7 Action of *Anupana*

The drug consumed along with *Anupana* spreads throughout the body in fraction of time as the drop of oil spreads so fast when put over the surface of water [15].

2.3.8 *Anupana Kala*

Depending upon the desired effect in the body the *Anupana Kala* (time) can be decided, for example for *Karshanartha* (emaciation) *Adipana* (early), for *Sthapanartha* (maintenance) *Madhyapana* (mid) and for *Brumhana* (nourishment) *Antapana* (last) is indicated [16].

2.3.9 Properties of *Anupana*

There are many properties described about *Anupana* few of them are like *Tarpayati* (it imparts refreshment), *Preenayati* (gives pleasure), *Urjayati* (provides energy), *Brimhayati* (it gives nourishment), *Bhuktamavasadayati*

(brings steadiness in consumed food), *Annasanghatabhinnatti* (helps in break down food particles), *Mardavamapadayati* (soften the food), *Kledayati* (brings the unctuousness of food), *Jarayati* (helps in digestion process), *Sukhparinamayati* (helps in proper assimilation), *Asuvyavayi* (spreads throughout body before the digestion process), *Aaharsya upajanyati* (supply the food to the tissue), *Rochan* (improves the taste), *Vrishya* (improves the potency), *Shramahara* (relieves fatigue), *Dipaniya* (act as appetizer), *Varnakara* (improves complexion) and *Yogavahi* (catalyst).

As the drop of oil spreads on water very fast likewise the *Anupana* also have the capacity to carry and distribute the drug throughout the body. Therefore due to increase in strength and potency the drug reaches all parts of the body. *Anupana* may relieve the side effect of medicine as well as facilitate the bioavailability of any drug [17] they can also serve as catalytic agent that is *Yogavahi*. They help to act direct effect of medicine to the deeper and subtler tissue to the body [18].

2.3.10 Matra/quantity of Anupana

Based on nature of *Vyadhi* (disease), *Kala* (time) and *Gunas* of *Dravya* (property of drug) *Matra* (dose) and *Prakara* (type) of *Anupana* should be decided. According to the type of formulations like *Churna* (powder), *Avaleha* (semi solid) and *Gutika* (tablet) *Acharya Sharangadhara* has mentioned the dose of *Anupana* based on predominance of *Dosha* like for *Vata*, *Pitta* and *Kapha Roga* the dose should be 3 *Pala*, 2 *Pala* and 1 *Pala* respectively [19].

2.3.11 Factors for selecting Anupana

Based on predominance of *Dosha* in diseases the different properties of *Anupana* should be considered. In *Vata Dosha* predominance the *Anupana Dravya* should be *Snigdha* and *Ushna*, in *Pitta Dosha* it should be *Ruksha* and *Sheeta*, in *Kapha Dosha* it should be *Ruksha* and *Ushna*. In case of *Kshaya* condition in patient *Mamsa Rasa* is indicated [20].

Based on diseases also different types of *Anupana Dravyas* are indicated like in *Shula/pain* condition, *Hingu* mixed with *Ghrita* is indicated, in *Purana Jwara Pippali* mixed with *Madhu*, in *Jwara Musta* and *Parpataka*, in *Chhardi lajudaka*, in *Atisara Kutaja*, similarly, *Vasa* in *Raktapitta*, and *Vidanga Kwatha* in *Udara Krumi*.

These are some *Anupana Dravyas* advised according to the diseases [21].

2.3.12 Contra indications for Anupana

In some conditions like *Kasa* (cough), *Hikka* (hiccups), *Shwasa* (dyspnea), *Pinasa* (rhinitis), *Urakshata* (injury to chest), *Urdhwajatrugata roga* (disease above clavicle), engaged in excessive singing, *Aadhyana* (excessive studying), *Atibhasya* (excessive speaking), why because *Jala* (water) *Anupana* removes the *Snehansa* (unctuousness or moisture) of these parts leading to *Vata Prakopa* (aggravation) hence *Anupana* may causes disease instead of mitigating it.

Also, while giving *Anupana* some caution should be followed, else it may cause *Ashaya Dushti*. It may diminish *Agni* by *Aabhisyandi* properties of *Sneha*, which is located in *Ura* and *Kantha* and may cause *Vamana* [22].

3. DISCUSSION

The concept of *Anupana* plays a very important role in the treatment. One drug can be used with different *Anupana* in different diseases. It can be beneficial in the condition where particular drug is unavailable; we can add a specific *Anupana* and can replace the unavailable drug. It plays an important role in carrying the medicine to the subtler tissue as it has synonyms 'Vahana.' It helps in fast acting and spreading of drug in body very quickly, so desired action of a drug can be obtained in a stipulate time period, which will be more beneficial for patients suffering from chronic as well as acute conditions. It is not only beneficial while using along with medicines but also it improves digestive fire, helps in digestion; break down the food particles and in easy absorption in the body. *Anupana* also have direct impact on body constituents when used in proper time. To evaluate *Yogavahi* (bioenhancer) property of *Anupana* is the need of the hour. Due to rapid advances in the field of pharmacy, drug designing and technology a large number of drugs have been introduced. Therefore, now a day's bioavailability enhancing concept is attracting the researchers to increase the drug absorption and to maintain the effective drug concentration to achieve desired pharmacological effect. So researcher can focus on the aspect on *Anupana* in different ways to help the mankind. Few researches have been carried out to prove the potency of *Anupana* [23]. A clinical study on efficacy of *Nagara churna*

along with *Kanji* as *Anupana* was conducted in 60 patients of *Amavata* for 21 days. In this study, 750 mg of *Nagara churna* along with 15 ml *Kanji* produces *Agni Deepana*, *Ama pachana*, *Vatanulomana*, *Shrotomukha vishodhana* and *Malanulomana* effect which relieves *Shotha* and *Shula* in patients. The study reveals that *Sunthi churna* with *Kanji*, as *Anupana* is effective in *Amavata* [24].

In children of age group of 0 to 5 years suffering from upper respiratory tract infection with symptoms like nasal discharge, congestion, cough with expectoration or dry cough, tachypnea, breathlessness, adventitious sounds, lack of appetite, irritability, sleeplessness were treated with *Kasahara kwath*, *Tila taila* with warm water as *Anupana*. This therapy shows statistically significant result in this study [25].

Another study has been conducted by Ediriwerra E.R.H.S.S. and Parera M.S.S in *Pakshaghata* (hemiplegia) *Chandra kalka* with *Mahadalu Anupana* used successfully in the treatment of early stage of *Pakshaghata*. The study was conducted on 30 patients randomly divided into two groups. One group receives 250mg *Chandra kalka* with 40 ml *Mahadalu Anupana* three times a day internally for 14 days and other group receives placebo therapy. In the trial group with *Anupana* of *Mahadalu* recorded statistically significant reduction in symptoms of *Pakshaghata*. The authors also clearly mentioned that the *Mahadalu Anupana* acts as a vehicle for main drug which activated, catalyzed or accelerated after combining with main drug. The *Anupana* of the *Mahadalu* enhances the action of *Chandra Kalka*. Therefore, great scope is there with this unexplored concept of *Ayurveda*, which needs to be established in a scientific way [26, 27, 28].

Considering all the above facts it can be Presumed that the *Anupana* increases digestion and absorption. Due to its *Yogavahi* property it may increase the oral bioavailability, decrease adverse effects of drug and makes the drug reaches the systemic circulation very quickly.

4. FURTHER SCOPE

Carum carvi is a common herb which is used in many *Ayurvedic* formulations and also used as carminative, diuretics shows bio-enhancing property when used with antitubercular drugs [29].

The concept of bioavailability enhancing effects of *Anupana* in *Ayurveda* is only documented. However, few recent scientific literatures practically proved it. Hence, this kind of innovative study will prove the *Anupana* concept in *Ayurveda* and same kind of study can be done on other *Anupana dravya*.

To enhance the bioavailability many approaches are initiated based on herbal origin. It would be presumed that this kind of study will be intrinsic to new researchers to perform in detail at cellular level

5. CONCLUSION

Anupana is a unique contribution of *Ayurveda*, which is a very essential part of food as well as medicine. *Anupana* not only enhances the drug potency, brings the desired effect but also cure the diseases by producing quick action. Considering the role of *Anupana* with food, it can nullify the untoward effect if present. It also improves the process of digestion and easy absorption of food. It has multidimensional role as it can be used as stimulant, nutritive, preventive and curative aspect in day-to-day life.

DISCLAIMER

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

NOTE

The study highlights the efficacy of " *Anupana* " which is an ancient tradition, used in some parts of India. This ancient concept should be carefully evaluated in the light of modern medical science and can be utilized partially if found suitable.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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