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### Review Article On *Sandhan Kalpana* In Ayurveda

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### ABSTRACT: -

Ayurveda is a traditional system of medicine. Ayurveda therapies have varied and evolve over more than two millennia. In the Ayurveda therapy includes medicines, special diets, meditation, yoga, massage, laxatives, enemas and medical oils etc. It is based on the belief that health and mitigation depend on a balance between mind, body, and spirit. In Ayurveda, compilation of traditional ancient Indian medicine practice is called Rasashastra, which detail processes by various metals, minerals and other substances including mercury. Rasashastra is a pharmaceuticals branch of Indian system of medicine which mainly deal with metals, minerals, animal origin product, toxic herbs and their uses in therapeutics. *Rasashastra & Bhaishajya Kalpana* is an important branch of Ayurveda. Preparation of medicine is performed in this. In Ayurveda many types of formulation are applied to cure the diseases.

Herbal and mineral preparation are used as single or combined forms to treat the disease. In Ayurveda literature, *Sharangadhar Samhita* highlighted the concept of the formulation. *Sandhan Kalpana* (biomedical fermented formulations) is an important formulation. It is used in the cure of many types of disease and health promotion. All preparation which is resulting from the fermentation procedure is included in *Sandhan Kalpana*. *Sandhan* is the process of fermentation where the liquid substance (*Kwath*, *Swarasa*, and other liquid preparation), sweetening agent (jaggery, honey, sugar), *praksepa* dravya (fine powder of medicinal drug), *Sandhan dravya* (fermentation agents) (*Dhakti Pushpa*, *Madhuka pushpa* as fermentation initiators) are put together in the mud pot or inert vessel and it is kept for a specific period to facilitate the process of fermentation.

**Keywords-** *Sandhan Kalpana*, *Kwath*, *Swarasa*, *prakshepa dravya* etc.



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## INTRODUCTION

Ayurveda is a traditional system of medicine. It is based on the belief that health and mitigation depend on the balance between mind, body, and spirit. Ayurveda medicine is preventing the health and cure of disease rather than fight diseases. Ayurveda prevents unnecessary discomfort and longevity. Ayurveda involves the use of the natural source to eliminate the root cause of disease by restoring. At the same time, it promotes a healthy lifestyle to prevent the imbalance of the body.<sup>[1]</sup>

*Rasashastra & Bhaishajya Kalpana* is an important branch of Ayurveda. preparation of medicine is performed in this. Herbal and mineral preparation are used as a single or combined form to treat the disease. In Ayurveda literature, *Sharangadhar Samhita* highlighted the concept of the formulation. Sometimes the chemical constituent of a single drug is insufficient to achieve the desired therapeutic effect but when using in combination with other multiple herbs, it will give a better therapeutic effect.<sup>[2]</sup> Thus, many formulations which are described in our classical texts are very important to health to treat diseases.

In Ayurveda formulation is based on the nature of drugs, their chemical constituent, pharmaceutical property, ease of administration, collection of material, shelf life, etc. The formulation may be the herbal, mineral, and herbal-mineral basis on the source. There many types of formulations e.g. *Panchvidh Kashaya Kalpana* and their *Anuklapana*, *Sneha Kalpana* (oil preparation),

*Sandhan Kalpana* (biomedical fermented formulations), *Avaleha Kalpana* (Medicated semisolid preparation), *Vati Kalpana* (Tablet), *Churna Kalpana*(powder) etc. *Sandhan Kalpana* is an important formulation.<sup>[3]</sup> It is used in the cure of any type of disease and health promotion. All preparation which is resulting from the fermentation procedure is included in *Sandhan Kalpana*. There is a unique identity because of self-generated alcohol which brings many added advantages. It is also called a spiritous liquid. Thus in Ayurveda, many dosage forms are uses to cure diseases and destroy any type of discomfort. *Sandhan Kalpana* is a unique dosage form where the drugs are made into the fermented product in acidic and alcoholic form.<sup>[4]</sup> A fermented product like alcohol works as preservatives and unique for their high stability, palatability, and better clinical outcomes. In this pharmaceutical preparation, multiple steps are the involvement of various drugs at different stages.

In *Sandhan Kalpana* liquids *Kashaya*(decoction), *Swarasa* (juice), etc. and drugs may be either medicinal or food drugs like *Guda* (Jaggery), Honey, etc. are mixed and kept in vessel together for sometimes to achieve fermentation, is known as *Sandhana*. Word *Sandhana* is mixing, compounding, Distillation of Liquors.

### Definition Of Sandhan Kalpana

From the etimological view, *Sandhan* literally means is,

“*Sandhiyte Yen Tat Sandhanam* –

*anekadravyasambharo yen madymyathavata pramenan sandhiyate*” Which implies the exciting amalgamation of several ingredients for the process of *Madyautpaadanam*, developing exhilarant attributes.<sup>[5]</sup>

*Sandhan* literally means is union, combination, or restoring. Thus, the medicines are mix together and allowed to in the same state for the specific time period. According to *Shabdikalpadruma Sandhan* is the process of fermentation. Acharya *Sarangdhar* has been well defining the *Sandhan Kalpana* (biomedical fermented formulations). According to that *Sandhan* is the process of fermentation where the liquid substance (*Kwath*, *Swarasa*, and other liquid preparation), sweetening agent (jaggery, honey, sugar), *Praksepa dravya* (fine powder of medicinal drug), *Sandhan dravya* (*Dhaskti Pushpa*, *Madhuk Pushpa* as fermentation initiators) are put together in the mud pot or inert vessel and it is kept for a specific time period to facilitate the process of fermentation.<sup>[6]</sup>

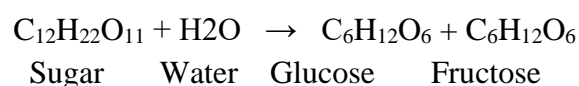
According to Acharya *Yadavji Trikam ji Dravyaguna Vinjanam paribhasha khand* that *Sandhan* is a liquid preparation like juice/decoction etc. either along with medicine kept for a long duration for the fermentation process. In *Paribhashaprabandh*, a process wherein *Dravdravya* or *Dravadravya* along with other *Aushadhdravya* is put in a vessel and sealed it and put it for a particular period to facilitate.<sup>[7]</sup>

### According to modern

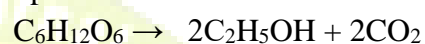
A metabolic process that releases energy from a sugar or other organic molecule, does not require oxygen or an electron transport system and uses an organic molecule as the final electron acceptor. It is a preservation method for food via micro-organism. Fermentation is incomplete oxidation in the absence of oxygen in sugar to ethanol and carbon dioxide by the

invertase and zymase enzyme which is secret by yeast cells in the addition of sweetening agent diluted in the liquid preparation. At the first stage, sugar converts into glucose and fructose. At further process, fructose converts into ethanol and carbon dioxide. In this process, ethanol is self-generated.<sup>[8]</sup>

Step – 1 In presence of invertase and zymase enzyme



Step – 2



Brought out different novel inventions by the human in a quest for health and longevity. The formulation are based on more palatable and all possible means that want to tried to preserve and uses for a long duration and increase the shelf life. *Sandhana Kalpana* is identified as the highest therapeutic and pharmaceutical among all other dosage forms. *Sandhan Kalpana* preparation has a long history since Veda or Purana period. At that time *Sandhan Drava* was known as *Madya* (Alcohol), *Sura*, *Somarasa*, etc. They were prepared with the utmost care, auspiciousness and used as the medicinal liquid. In later periods this preparation more use as an intoxicating drink but less medicinal value. Thus, appropriate use of the preparation becomes a great boon to the medicinal world.<sup>[9]</sup>

### Significance of Sandhan Kalpana

- It is a self-generated alcohol preparation that acts as a preservative.
- It's a better preparation because of infinite shelf life and increase potency with time. So they are easily stored.

- Important properties of Madya like *Tiksna guna* (sharp) help in quick absorption and assimilation of medicine.
- It is more stable preparation because of good bio-availability and therapeutic efficacy.
- It is a liquid preparation so it may be easily administered by pediatric and geriatrics cases.
- It is good for stimulating the activity of digestive enzymes.
- Sweetening agents are well palatable which are used in *Sandhan Kalpana*.
- These also work as good nutrition to the body.

#### **Ingredient for Sandhan Kalpana<sup>[10]</sup>**

- *Kwatha dravya* (Decoction drugs)
- *Drava dravya* (Liquid drugs)
- *Madhur dravya* (Sweet drugs)
- *Prakshepa dravya* (Synergizer)
- *Sandhan dravya* (Fermented drugs)

#### **Important factor in fermentation preparation**

- **Selection of Sandhan Patra** (fermentation container)

(a) Mud pots - According to classical texts mud pot (*Mritika Patra*) should be used.

#### **Disadvantage :-**

- For larger-scale one mud pot can't be use.
- It's difficult to use again and again even though asked to do so in classical texts.
- Mud-pots more delegates and often crumble after a single use.
- China clay pots may be a comparatively better choice

(b) Wooden drums - Nowadays wooden drums are used by many pharmacies for large-scale production.

#### **Disadvantage :-**

- Not availability of good quality wood.

- After one time used, it is difficult to clean and drying of wooden vessels.

- These cannot be re-used for a different sample like *Amritarishta* and *Draksharishta*.

(c) Cement tanks - In some pharmacies, cement tanks are used at larger-scale production.

#### **Disadvantage :-**

- Loss of preparation will be more.
- It is very difficult to clean and wash after each use

(d) Synthetic drums –

- Synthetic drums are more use now-a-days as they are the most advantages over many other containers.
- They are lighter in weight.
- Easy to handle.
- They are easy to clean and dry.

(e) Glass jar – Glass jar is also used for the fermentation process. These are non-reactive containers.

#### **Disadvantage :-**

- These are too delegate to handle.
- They are cost-effective.

(f) stainless steel drums –

- These are available in different sizes. These are very advantageous over all other containers.
- These remain very much in all over the condition.
- They are easy to use and clean easily.
- These are the best container for the fermentation process but they cost effective.

- **Sanskar of Sandhan Patra** (fermentation container)<sup>[11]</sup>

*Sanskar* is the main feature to start the fermentation process in a particular vessel. *Sanskar* means a process to the cleaning of vessel, fumigation to it and special application inside the vessel, sealing off the cracks, etc.



These are performed to find out a good fermentative product.

### **Patra-Sanskar**

**Samanya Sanskar (General)**– It is either *Ghrita lepana* (Herbalized ghee preparations) inside the vessels or the *Dhoopan* (Fumigation) process done on the vessels. In *Dhupan* or fumigation process using the drug-like *Aguru* (*Aquilaria agallocha*), *Chandan*, (*Santalum album*), *Jatamansi* (*Nardostachys jatamansi*), *Karpura* (*Cinnamomum camphora*) and other *Krimighna dravya*.

**Vishista sanskar (Specific)** – It is used for clean the vessels for multiple time use. In this process used pot is washed with hot water. Now it is filled with *Sudha-Jala* and boiled for an hour. After it, liquid inside is discarded and the pot is washed again with hot water until litmus paper test negative in washed water. Now the pot will dry in under sunlight and re-use for fermentation. In *Prelepana sanskara* selected drugs to use as paste form inside the pot. There are *Lodhra* (*Symplocos*) and *Dhakti Pushpa* (*Woodfordia fruticose*) are use in *Kalka/paste* form inside the pot. By this process, fermentation may be three times.

*Dhoopan dravya* (mode of disinfection) is well define in different texts. According to *Charak Samhita*, *Dhoopan dravya* (fumigation process) are *Sharkara* (sugar) and *Aguru* (*Aquilaria agallocha*) may be used e.g. *Kankarishta*. Acharya *Sharangdhar* has been indicated as *Dhoopan dravya* (fumigation process) *Mansi* and *Marich*.

### ➤ **Place of the fermentation** <sup>[12]</sup>

- According to classical texts, the vessel should be kept in *Dhanyarashi* and mud pots in the earth.
- According to *Acharya Shodal* has been mention some specific palace *Bhugarbha*, *Suryatarpa*,

etc. according to *Yogendra Chintamani Ashwashala* for *Jambhirasav*, etc.

- Now-a-days pharmaceutical companies a separate temperature regulate room is maintaining.
- The selection of a palace for the *Sandhan* (fermentation) is to maintain the required temperature.
- About 30<sup>0</sup>C to 35<sup>0</sup>C temperature perfect for the *Sandhan Prakriya* (fermentation) in vessels.
- In the ancient period to maintain the temperature mud pots were kept dug in the earth.

But there are several disadvantages like more chance to breakage.

Kept the pots in the husk of paddy is consider to the better method but this method was used at small level production.

- **Prakshepa Dravya** – *Prakshepadravaya* is added in fine powder form with *Sandhan dravya* (fermentation). *Prakshepa dravya* should be a dry drug and non-infested.

### ➤ **Sandhan Dravya (Fermentation products)**

- The role of *Sandhan dravya* (fermentation products) which are collected from natural origin is a good scientific approach as natural fermentation initiators.
- Some important *Sandhan dravya* (fermentation products) are described in classical texts. *Dhataki Pushpa* (*Woodfordia fruticose*), *Madhuka Pushpa*, yeast is used as fermentative initiators.
- *Dhataki Pushpa* is the best *Sandhan dravya*. Only dry flowers of the *Dhataki* (*Woodfordia fruticose*) are to be put after proper cleaning.
- *Madhuka Pushpa* (*Madhuca longifolia*) which is commonly known as Mahua flower is a colored flower found at western areas.
- It is a good source of sugars and essentials nutrients and vitamins also.

- Recent texts such as Indian Materia Medica Vol Ist (K.M.Nadkarni), Illustrated Bhaishajya Kalpana Vijnana (Dr. P. V. N. R. Prasad) mention the presence of yeast in *Madhuka Pushpa*.
- If they are not clear proper there are more chances of fungal growth in preparation.

#### ➤ Duration for *Sandhan Kriya* (Fermentation)

- In classical texts important roles of *Desh* (place), *Ritu* (season) and *Dravya* (drugs) are described in the completion of *Sandhan Kriya*.
- The period in classics is 7 days to 6 months. It depends on the nature of the drugs,

constituents, sweetening agents, place, and fermentative initiators.

- In the summer *Sandhan Kriya* (Fermentation) may be completely one or two weeks and in the winter season, it may take months.

#### Classification of *Sandhan Kalpana*

There are two types of *Sandhan Kalpana*.

- *Madya Kalpana* (Alcoholic preparation)
- *Sukta Kalpana* (Acidic preparation)

**Table no. 1 Classification of *Sandhan Kalpana* [13]**

S.No.	<i>Madya Kalpana</i> (Alcoholic preparation)	<i>Sukta Kalpana</i> (Acidic preparation)
1.	<i>Asava</i>	<i>Tushambu</i>
2.	<i>Arishta</i>	<i>Sauvira</i>
3.	<i>Sura</i>	<i>Kanjika</i>
	a) <i>Prasanna</i>	<i>Sandika</i>
	b) <i>Kadambari</i>	
	c) <i>Jagala</i>	
	d) <i>Medaka</i>	
	e) <i>Surabija</i>	
4.	<i>Sidhu</i>	
5.	<i>Varuni</i>	

**Historical perspective** - Alcohol like drink and fermentative product are using from ancient period. *Sura* and *Somarasa* which are fermentative formulations are described in Rigveda, Yajurveda, and Atharvaveda as Devine offered to the god. Raw and cooked cereals, the bark of some trees are described in the Vedas period. In Vedic literature use of the wooden containers for fermentation formulation like distilled alcohol and juice of Soma. These offerings to God were meant for human consumption.

In *Kautilya arthashastra* fermentation

formulation namely *Medaka*, *Prasanna*, *Asava-Arishta*, *Kinva Surabeeja*, etc. The use of a variety of ingredients and methods to develop medicaments with self-generated alcohol for different diseases became more prevalent.

**In the Samhita period** – Three major Ayurveda Texts namely *Charak Samhita*, *Sushruta Samhita*, and *Ashtanga Hridaya* described the pharmaceutical and therapeutic uses of the fermentative product. *Acharya Charak* has been described an herbal source for fermentation like *Phala* (fruit), *Dhanya*

(cereals), *Mula* (root), *Pushpa* (flower), *Twaka* (skin), *Sara*, *Kanda*, *Patra*(leaves), *Shankara*. *Acharya Charak* also described the fermentation process, preparation method, specification of containers, the time period for the fermentation, specific testing parameters, outcome of the product, and clinical usage of final products.

*Charak* defined *Soma Rasa* as

“*Aushadhinam Shreshtham*” and *Sura* was credited as “*Shramharanam Shreshtham*”<sup>[13]</sup>.

In *Sushruta Samhita* has been described several types of fermentative product during a surgical procedure for example *Madya*, *Sura*, *Prasanna*, *Jagala*, *Surasava*, and also described *Dhanyamala* in *Madya* category. In *Ashtang Hridaya* first time described the *DhatakiPushpa* as the fermentative initiator. Also described the five sources of preparation of *Madya* (Alcohol) like *Draksha* (*Vitis Vinifera*), *Ikshu* (*Saccharum officinarum*), *Madhu*(honey), *Shali* (*Oryza sativa*), and *Vrihi* (*variety of rice*). In *Kashyap Samhita* described the *Abhisava* as a fermentative drug. In *Sharangdhar Samhita* first, clarify the difference between *Asava* and *Arishta*. Accordingly, *Asava* is prepared with fresh juice or extract of the plant but not using the heat at any stage and keep in a vessel for fermentative reactions. But in *Arishta Kalpana* there is the preparation of decoction with *Agni Sanyoga* or direct heat.

Some other compendia of Ayurveda formulation are also mentioned the fermentation formulation e.g. *Shodhal Nighantu*, *Raj Vallabh Nighantu*, *Nighantu Ratnakar*, *Raj Nighantu*, *Dhanvantari Nighantu*, etc. *Bhaishjya Ratnawali*, *Sahasrayogam*, *Gada Nigraha*, and *Yogaratanakar* have separate descriptions of *Asavas-Arishta* for the treatment of a wide range of diseases.

(1) ***Madya Kalpana*** – *Madya Kalpana* is an alcoholic preparation.

According to *Yoga Mahodadi Madya* is a drink or liquor which produces *Madakata*/Gladdening in the consumer. Historical view of the *Madya* is mention in the Vedic period also but it has been used as a medicinal purpose only from the time of Ayurvedic literature like *Charak*, *Sushrut*, etc.

#### Advantages of *Madya*

- Easily administered.
- It may be used for a long period without loss of property.
- More effectiveness.
- Safe in use and economically cheap.
- Easily accepted by the patient.
- Palatable.

*Asava*, *Arishta* are the more popular alcoholic preparation prepared by the fermentation process.

*Acharya Sharangadhara* has cleared difference between *Asava* and *Arishta* i.e., *Asava* is prepared without boiling the drug in water. It may be prepared by *Hima Kalpana* or *Swarasa Kalpana* whereas, *Arishta* is prepared by making use of decoctions.<sup>[14]</sup>

Detailed description about *Asava-arista* first time told in *Charak Samhita* but deference between *Asav Arishta* given by *Acharya Sharangdhar*.

- I. ***Asava*** – In ancient times the term *Asava-Arista* are used as a synonym. but at the time of *Acharya Sharangdhar* has been differentiated probably on the basis of a majority of cases. According to *Acharya Sharangdhar*, *Asava* is prepared without boiling the drugs and *Arishta* is prepared boiling drugs with liquid. Therefore *Asava* is that in which fermentation is allowed to proceed for generating alcohol and drugs kept without boiling.

- II. **Arishta** – *Arishta* are that in which fermentation is allowed to proceed for generating alcohol in the liquid and drug kept after boiling.

*Anuktamaan* for *Asava-Arishta*

Acharya Sharangdhara has been well defined about the liquid, sweetening agent, and *Prakshepa dravya* for a *Sandhan Kalpana*.

Liquid	-	1 Drona
Jaggery ( <i>Guda</i> )	-	1 Tula
Honey (half of the jaggery)	-	½ Tula
<i>Prakshepadravya</i>	-	1/10 of jaggery

#### Dose and adjuvant <sup>[15]</sup>

According to Acharya Sharangdhara

- Its dose is 1 *pala* (48 gm).
- It dilutes in water or such as before or after the meal.

#### Pharmaceutical procedure for *Asava-Arishta*

##### *Purva karma (Pre-operative)-*

Selection of the *Patra* (container)

*Lepa* in *Patra* (container)

*Dhoopan Kriya* (container)

Collection of the raw material

##### *Pradhan karma (Procedure) – [16]*

Preparation of *Swarasa* or *Kwatha*

Mixing of Sweetening agents (*Madhura Dravya*).

Mixing of Fermentative agent (*Sandhana Dravya*).

Mixing of (Additives) *Prakshepa dravya*.

Filling of the material and packing to the *Patra*.

Keep the *Patra* in temperature maintain palace.

The time frame for fermentation.

##### *Paschata karma (Post procedure) -*

Observation of fermentation reaction

Filter after completion of *Sandhan Kriya*

Keep in airtight bottle.

**Table no. 2 Difference between *Asava-Arishta* <sup>[17]</sup>**

S.no.	<i>Asava</i>	<i>Arishta</i>
1.	These are prepared without boiling of drugs.	These are prepared to boil with drugs.
2.	It is <i>Drava Pradhan</i> (Liquid) preparation.	It is <i>Dravya Pradhan</i> (drug) preparation.
3.	The potency is comparatively less.	The potency is more because of the addition of <i>Agni-sanskar</i> .
4.	These are prepared generally with a majority of <i>Shitavirya dravya</i> (cold potency)	Prepared generally with a majority of <i>Ushnavirya dravya</i> (hot potency)
5.	These are preferred mainly in <i>Paitikvyadhis</i> .	These are preferred in <i>Vataj-Kaphajavyadhi</i> .



Generally, *Asava* is prepared without boiling of drugs but some *Asava* is boiling with drugs -

S.no.	Asava	Granthadhar
1.	<i>Kumaryasav</i>	<i>Yogaratanakar</i>
2.	<i>Drakshasav</i>	<i>Rasatantra Sara Evm Siddh Prayoga Sangrah</i>
3.	<i>KharjuRasav</i>	<i>Yogaratanakar</i>
4.	<i>Madukasav</i>	<i>Ashtang-Hridaya</i>
5.	<i>LodhRasav</i>	<i>Ashtang-Hridaya</i>
6.	<i>Vasakasav</i>	<i>Gadanigrah</i>

Generally, *Arishta* is prepared with the boiling of drugs but some *Arishta* in classics are prepared without boiling of drugs.

*Takrarishta* -

*Bhaishjya Ratnawali* 8/609-10

*Charaka Chikitsa* 14/72-75

*Rasa ratnasammuchya* 18/53-54

Drug and Cosmetic Act related with *Asava-Arishta Kalpana* –

According to Drug and Cosmetics Rules 1945, part XVII, Rule 161 clearly mentioned the limit of Alcohol in Ayurvedic medicine.

### III. Sura

- It was first described by Acharya Charak in Sutra Sthan chapter 25th.
- It is included in a type of *Dhanyasav*.
- According to Hemadri Sura is a type of alcoholic preparation prepared by the fermentation of flour of the rice.
- According to Acharya Sharangdhar, Sura is prepared by the fermentation of *Paripakva-anna* (Sha. Sa. Ma. Kha. 10/5).
- Acharya Dalhan has been described the color of Sura as slightly reddish.

#### Therapeutic Use of Sura<sup>[18]</sup>

- It is beneficial for weak persons, with difficulty in micturition.

- It's uses in *Stanyakshya* (less lactation) and *Raktkshya* (blood depletion) and cures the *Grahani* (sprue) and *Arsharoga*.
- According to *Bhavprakash*, Sura is *Guru*, *Stanyavridhikar*, *Kaphavardhak*, *Sotha*, *gulma*, *Arsha*, *grahani*, and *Mutrakricchanashak*, etc.

*Sura* is divided into 5 layers. These layers are thicker consistency from above to downward.

#### (A) *Prasanna-*

Upper most part of the Sura is called *Prasanna*. It is also called *Madira*, *Suramand*. It is a clear supernatant part of *Sura*. It is highly gladdening or intoxicating due to the higher concentration of alcohol.

It is *vataghn*, good for *Hikka-kasa* (hiccups-cough), *Shwas*(asthma), *Pratishyay* (coryza), *Malabaddhata* (constipation), *Aruchi* (anorexia)and *Vaman* (emesis) etc.

(B) *Kadambari* - It is less concentration of alcohol and slightly thicker than *Prasanna*.

(C) *Jagala* - *Jagala* is less concentration of alcohol and comparatively thicker than upper most layers.

*Jagala* is the *Grahi*, *Ruksa*(rough), and *Ushna*(hot) properties. It is beneficial for *Sotha*(inflammation), *Sula*(pain), *Pravahika* (diarrhea), *Atopa*, *Vataja*, and *Kaphajashool*,

etc.

(D) **Medaka** – It is a semisolid layer of VI. the *Sura* which is found above the *Surabija* which is the lower most layer of *Sura*. It is less concentration of alcohol. *Acharya Charaka* included it in the *Dhanyasav* group.

(E) **Bakkas** – *Bakkas* is the solid part at the base of the fermentation vessel. It is also called *Surabija* or *Kinwa*. It may be used to stimulating the fermentation process in new fermentation preparation.

IV. **Sidhu** – It is divided according to the heat process.

- a. *Pakwa Rasa Sidhu*
- b. *Apkawa Rasa Sidhu*

**Pakwa Rasa Sidhu (cooked sidhu ras)** – When sugarcane juice or any other *Madhur Dravya* (sweet) fermented without boiling is called *Pakwarasa Sidhu*. It is also called *Sitarasa Sidhu*. *Pakwarasa Sidhu* improves the *bala* and *varna*. it's *sophagna* (anti-inflammation), *dipan*(appetizer), *hridaya*(cardic-tonic) also used in *kaphaj-arsha* etc. According to *Acharya Charaka*, *PakwaRasa Sidhu* is digestive, clear the voice and complexion, anti-obese. It also treats constipation, abdominal disorder, and piles etc.

**Apkawa Rasa Sidhu (cooked sidhu ras)**<sup>[19]</sup> – When this fermentation process is applied with the boiling of *dravya* is called *Apkwarasa Sidhu*. It is digest the food, laxative, improve the *Swara* and *Varna*(voice and complexion), *Lekhana*(scrapping), *Udararoga*(abdominal tumor), *Arsharoganashak*, etc.

V. **Varuni** – When *Kharjura Rasa* is kept for fermentation in a mud pot for 2-3 days. After this period liquid inside the undergoes

fermentation and gain considerable alcoholic preparation. This preparation is called *Varuni*.

**Kohala** – In this preparation *Yava* and *Saktu* kept for the fermentation process. According to *Acharya Chakrapani*, it is called *Madhulaka*. It is *Tridoshashamakvrishya* and *Dipan*. It is *Ruksha*(rough), *Ushan*(hot) and *Guru* property. It is *Vatapittashamak*, *Jirnakarak*, *Vishatambi* (constipated)and *Kaphakaraka* etc.

## (2) **Sukta Kalpana**

It is also prepared by the fermentation process. In this fermentation, preparation acid is produced. Their taste is mainly sour. So it is an acidic fermented preparation which prepared indirectly or when alcoholic preparation turn in the acidic form. Generally included 5 Rasa in *Madya* but only sour Rasa is present in *Sukta*. According to *Acharya Dalhan* when *Madya* preparation turn into acidic form when keeping for a long period and masking other taste then it is called as *Sukta*.

According to *Acharya Sharangdhar* when the liquid adding with *Phala* (fruit), *Dhanya* (cereals), *Mula* (root), *Pushpa* (flower), *Twaka* (skin), *Sara*, *Kanda*, *Patra*(leaves), *Shankara* etc. are used with *Sneha*, *Lawana*, *Rajika*, *Haridra*, etc. are put to fermentation in any *Drava-Dravya*. After it sour fermented liquid obtained it is being called “*Sukta*”.

According to *Yadav Ji Trikamji* when *Madya Kalpana* or a sweet liquid becomes spoiled and produces an acidic taste or turns into acidic fermentation preparation then it is called *Sukta*. Similarly, the *Sukta* may be prepared using sugarcane juice and grapes juice.

*Sukta Kalpana* which is prepared by used of *Phala*(fruit), *Pushpa*(flower), and *Mula*(root) not produced undesirable symptoms in the human body.

Thus it has been cleared that all *Sukta* and food material are not contraindicate for internal use. But the preparation which is become sour due

to decomposition putrefaction and produce the complication in the human body they are contraindicated for use.

In modern *Sukta* is known as *Siraka* in Hindi, Vinegar in English. Mainly Vinegar is prepared by fruit juice in keeping a close vessel under sunlight till they become acidic and after it will be filter and stored. For the preparation of good Vinegar generally, 2 months are needed.

Source of *Sukta* – There are many sources for *Sukta* that are described in classical texts.

**Chukra** – When fermented liquid or fermented *Madhur Drava* (sweet) become sour it is called *Vinasht*. When this process of fermentation takes in the *Vinashta*, the obtained liquid will be called *Chukra*.

**Tushambu** – When raw broken barley is kept for the fermented process then obtain sour liquid is called *Tushambu*.

**Souvira** – When *dehusked* and cooked barley kept for fermentation process is called *Souvira*. According to *Acharya Adhamalla* both the *Tushambu* and *Souvira* are the type of *Kanjika*.

**Kanjika** – *Kulmasa(Kutsita Masa)*, *Dhanya* (*Shastikashali*), *Manda* (cooked rice water), etc. are put together in a clean mud pot and kept for the fermentation process.

After two weeks open the mud pot seal and obtain a sour liquid called *Kanjika*.

**Sandaki** – When *Mulika*, *Sarshapa*, *Saindhavalawana*, *Jira*, *Shuddhingu* kept for fermentation with 8 times of water and obtained sour liquid is called '*Sandaki*'. It is laxative, sharp, and *Pittakaraka*.

**Siddhi Lakshan for completion of Sandhan Kalpana**<sup>[20]</sup>

- First of all the *Prakshepa dravya* will be settled down in the vessels.

- When fermentation will be completed then we can't hear any type of sound from outside.
  - When a burning matchstick will be taken inside the vessel then it will keep burning.
  - After completion desired color, odor and taste will be attained by prepared liquid.
  - When a sample will be taken in a transparent glass tube no type of particle will present if there will be seen then it is not completed.
- Now we can consider by all *Siddhi Lakshan* that a fermentation preparation is completed or no if there are no find any type of *Siddhi Lakshan* then it will keep for more time to attain *Siddhi Lakshan* or completion of the preparation.

## DISCUSSION

Ayurveda is a medical science which cure diseases from ancient time to present era. Quick action, palatable, easy to administration and economical cheap is a major concept to take a medicine.

These all are qualities are mention in *Sandhan* prepared medicine. Properties of these prepared medicines have been mentioning in daily clinical uses. Like *Asava-Arishta* are used in the cure of diseases, easy to take and quick action. In the present scenario, these preparations are used at a broad level. These preparations use to improve mental strength, decrease insomnia, increase physical strength, and as an appetizer.<sup>[21]</sup>

*Sura* used for *Stanyakshya* in lactating mother who has low production of milk in mother. *Sidhu* is use as *Swarya* in low speak people, *Shukta Kalpana* use for *Krimijanyavikar* and *Mutravaha srotasjanya vyadhi*, *Kanji* use in *Vata-Kaphajanyavyadhis*, *Klama* and also used in *Asthanbasti* (Medicated enema).<sup>[22]</sup>

Thus, the Ayurveda fermentation preparation is more commonly used in the olden period to the present scenario.

## CONCLUSION

Ayurveda is all set to regain its lost fame because of its curative and preventive nature and less side effect. *Sandhan kalpa* (fermentation products) is an important ayurvedic formulation which widely used in various diseases. They have nutritive as well as appetizer. Their advantage due to palatability, quick action, easy to administered, longer shelf life and the preparation are preferred by consumers. In classical texts *sandhan kalpa* are very prominent of Ayurveda literature. In ancient period to preparation of *sandhan kalpa*, the *sandhan patra* was placed in *dhanya-rashi*, *bhugarbh* etc. to avoid from temperature variation. In modern science fermentation is growing vastly in various field i.e., biotechnology, pharmacy and microbiology. Fermentation is a biological and biochemical procedure in which metabolic changes take place. *Sandhan Kalpana* highly beneficial over other formulation in Ayurveda as this process having medicinal as well as nutritional value.

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