

## CONCEPT OF AYURVEDIC SODHANA METHOD AND ITS EFFECTS WITH REFERENCE TO SULPHUR

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*ABSTRACT: SODHANA, which literally means purification, is a procedure necessary for every drug before taking it for adding in any compound or subjecting it for further processes like Bhasmikiranana (incineration) etc. Purified drug in the lines of modern science is different from that of Ayurveda as the former is cent percent the main drug only and latter may contain other particles also. Present paper gives the details of Sodhana along with such methods practically done on Sulphur.*

### Introduction

In Ayurvedic medicine the concept of Sodhana treatment was in practice since the times of Caraka Samhita (1000 B.C to 500 B. C.). According to it (Caraka Samhita) Sauca (Suddhikarana) was also included in the measures claimed to be responsible for the alteration and /or addition of the properties of the drugs while subjected to various Pharmaceutical operations and treatments. The importance of this (Sodhana) treatment has enhanced further after the development of Rasa/mineral therapy in the field of Ayurvedic medicine i.e. from 8<sup>th</sup> cent A.D. onwards. In this period the ancient scholars who encouraged the use of mineral drugs in the therapy, have also recognized the toxicity of the mineral drugs in general and considered as the important basic materials of Rasa/mineral therapy of India. During their times number of measures and processes were developed for purifying the mineral drugs with a view to remove their toxicity completely or to minimize it to the least possible level.

In the course of Sodhana method the drugs of mineral origin are subjected to various grinding, heating, fomenting, subliming, and distilling etc. processes which in turn remove soluble, evaporable and washable impurities from these drugs. For this purpose these drugs are either treated with acidic, Alkaline and neutral types of vegetable extractives/liquids and/or with the oily materials in the presence or absence of heat for a specified period.

In some cases only heat treatment is given in a specified apparatus so as to remove their volatile and/or thermostable impurities. Grinding in hot and cold condition is also done to reduce and disperse the particles of the materials and thus exposing maximum portion of the drug to the purifying material.

These treatments not only remove the soluble, evaporable and washable impurities of the mineral drugs but also add some materials with them which from chemical point of view may be taken as impurities but from pharmacological point of view prove beneficial by reducing their toxicity to the great extent. It may thus be pointed out that

the Ayurvedic Sodhana method is not only a chemical purification but it is something more than that which sometimes lower the chemical percentage of purity of the materials considerably still the treatment is claimed as the purification treatment. Besides, Ayurvedic Sodhana treatment also impregnate organic materials and their properties in the inorganic drugs/products to facilitate their utilization by the body tissue and organs. From pharmaceutical point of view Shodhana treatment helps in converting the materials in such a state which is suitable for further Marana/Satwapatana etc. treatments.

In the present paper the role or the effect of Sodhana treatment is discussed in relation to sulphur which forms an essential part of the constituents of many (more than thousand) Rasa preparations. (Mercurial preparations).

### **Literary review of the Sodhana Treatment.**

Though references regarding the Sodhana treatment are available since the time of Ayurvedic classics but the details about this treatment could be traced only after the development of Rasashastra/Rasachikitsa (mineral therapy) in Ayurvedic medicine i.e. from 9<sup>th</sup> cent. A.D. and onwards. Historically development of this treatment could be seen only in Mediaeval period i.e. from the period in which mineral/ poisonous and sub poisonous drugs acquired prominence over other types of drugs in the therapy. These drugs acquired prominence because of many superior qualities these possess, than their counterparts. The only disadvantage they have, is their high toxicity and very little absorption. If these could be overcome there is no drug which may be compared with such drugs in qualities and effects.

It is with this view in mind the Sodhana method of Ayurvedic pharmaceutical science has been developed to this extent that is, when applied properly render these drugs either completely free from toxic/undesired side effects or minimize them to the desired extent. Knowing the different nature of impurities, ancient scholars have suggested different types of drugs for their purification as were considered necessary. These scholars developed Sodhana treatment not only to remove their toxic materials but to convert them to the pharmaceutically suitable forms in which these may be absorbed into the system if used internally or may be treated further.

### **Sodhana Methods and their Suitability.**

#### **1. Heating & Dipping:** (Tapana & Nisecana)

This is a most common type of Sodhana treatment which is applicable in majority of cases i.e. in cases of almost all the metals and majority of gems. In this process materials taken for sodhana purpose are heated to red hot and dipped into the various types of cold liquids (oily, acidic or alkaline types). This heating and dipping is repeated for number of times varying from material to material i.e. depends on the nature of the material (mineral drug).

This method of purification is applicable for the drugs which are very hard in nature, such as Iron, Mandura (Iron oxide, mass), Copper, Mica, Diamond etc. which are of very hard consistency. The heating to red hot and dipping in cold liquids help in disintegrating the particles and thus reducing their size. This treatment either converts material in coarse powder form by simple hammering. Repeated heat and cold treatment and specially in oily, acidic and

alkaline medias plays an important role in this Sodhana treatment. This repetition of the process may be adjusted with the hardness of the material. If the hardness is more, the repetition number is also more as in case of diamond this treatment should be repeated even 100 times while in ordinary metal this number is seven for each liquid.

## **2. Heating, Melting and Pouring into Cold Liquids:**

This process is applicable in cases in which the drugs melt at a low temperature, such as Lead, Zinc, Tin and Sulphur. This treatment also needs a few repetitions to convert the material into coarse granules and to a brittle state. In case of Sulphur, ghee is added while melting with a view to remove fat soluble impurities and than melted sulphur is poured into cold milk or vegetable extract through a filter cloth to remove insoluble impurities (stony particles and dust) on the filter cloth and water soluble impurities in milk and vegetable extractives. The treatment of Sulphur, with ghee and milk which, according to ayurveda, have been recognized as detoxicating agents, are likely to reduce its toxicity to a certain extent.

## **3. Grinding with Herbal Drugs and Their Extracts:**

This process is applicable in cases of drug which are soft in nature, such as Mercury, Kasisa, Gairika, Hingula, Manahsila etc. The drug which are purified with 'Bhavana' are included in this group. Here the drugs are treated with the paste of certain herbs and other drugs such as salts, alkalies, carths and some vegetable extractives having acidic/ alkaline reactions or with acidic juices and/or fluids for a specified period. In case of Parada, Mardana (grinding) is recommended in Tapta-Khalva (hot mortar). In this process the drug to be

treated is reduced to fine particle to expose its maximum part to is the purifying materials (drugs/liquids). In this way, forcing each particle to come into contact with the purifying drug and thus allowing soluble impurities to go into the solution and soluble materials of the purifying substance to enter into the drug. This phenomenon helps to remove the soluble impurities to go out and useful materials to be added to the drug. This could be detected with the Chromatographic studies.

## **4. Fomenting or Boiling with Liquids.**

This is also a common method of purification applicable to many drugs. Here the drug is allowed to remain to contact with boiling liquid for at least three hours. The impurities which are soluble only in boiling hot acidic or alkaline liquids could be removed through this process. The drugs purified with swedana process come under this group. Sometimes the paste of certain drugs is also placed along with the drugs. This also helps in accelerating the soluble impurities to go into the solution of boiling liquid. This method is applicable in cases of Mercury, Harital, Manahshila, Sankha, Sukti, Varata, Mukta, Pravala and a few precious stones. In some cases this method removes soluble impurities and in some cases external impurities.

## **5. Sublimation and Distillation:**

These are applicable in cases of drugs which may have low vaporization point. In this process the drugs are treated with acidic fluids either mixed with vegetable or with mineral drugs and made into the paste which when put in a special apparatus (urdhwapatana yantra, Damuru yantra, Adhahpatana yantra or Tiryakpatana yantra) and heated strongly sublimes or distilles as pure material either in upward, downward or

in transe-verse direction. In this way Mercury, Sulphur, Navasagara etc. drugs are purified.

### **6. Soaking in the Liquids:**

This is applicable in cases of vegetable poisons such as Vatsnabha, Ahiphen, Gunja etc. and Shilajatu. In this process the drugs which are to be purified are cut into pieces and soaked into the liquids such as Gomutra, Kanji etc. for at least three days i.e. allowing sufficient time to the drug to remain in contact of purifying liquid, so as to allow its soluble poisonous matters to go into the liquid (solution) and making the drug purified. In case of Guggulu soaking in boiled water is done.

### **7. Frying:**

This is applicable in cases of drugs which either contain water or volatile substance such as spatika, Tankana Swarna-Maksika etc. here the purifiable material is put into the iron pan and subjected to heating with or without adding any material/ liquid while heating. In this process constant stirring of the material is done till the water of crystallization evaporates and the material becomes puffed or till the added liquid is evaporated and the material is converted into red. In case of Hingu frying in ghee method is applied. Here also moisture content is lost and material becomes light and puffed.

### **Purification of Sulphur:**

According to Ayurveda to Rasa Texts there has been a mention of four varieties of sulphur based on colour. Of the four only yellow varieties is commonly available and recommended for use. Commercially yellow sulphur is available in two types i.e. Amalasar and Nenuasara (crystal sulphur and roll sulphur). Of the two

commercial types only Amalasar Gandhaka is recommended for internal use and Nenuasara is considered very inferior to former one in qualities hence not recommended for internal use. It is used externally only.

According to the texts Amalasar Gandhaka should also be used after proper purification as unpurified sulphur is likely to cause a few toxic manifestations, such as Kustha, Santapa, Bhrama, Klama, Balaviryahani and a few paittic disorders.

### **Shodhana Methods of Sulphur:**

There are number of Shodhana methods for Sulphur according to the texts. Of these only four methods which are considered popular in the various parts of the country and for various purposes have been selected for the present study. Their selection was also based on the easy effectiveness in therapeutics.

### **Aim of the Study:**

The study is aimed to standardize the method and to select best out of them.

### **Materials and Methods:**

**Materials:** A. Amalasar Gandhaka of best quality was obtained from the market. It was selected as per the specifications laid down in the texts.

B. Ghee and Milk – For the present experiment cow's Ghee and milk (pure as far as possible), were obtained from the market (Diary).

C. Vegetable drugs and their extractives such as Bringaraja, Kumari, Palandu (small variety) and Karanja and Eranda oils were

also obtained from the herbal garden and local market.

**Methods:** 1. Though, the method followed for purification is one in all the four experiments but fat medias and liquid medias which were considered as the most effective parts of the method, were altered in each experiment so as to determine their values and effectiveness in making Sulphur highly effective against skin disorders.

### **Equipments and Accessories:**

Heater, stainless steel vessels, spoons, iron ladle, filter cloth, thread, thermometer, balances, grinding and crushing equipments.

The juices of Bhrngaraja, Palandu, Dhatturapatra and Ghrta Kumari were obtained through the conventional methods for using as dipping liquids.

### **Procedure for Sulphur Purification:**

#### **1<sup>st</sup> Experience>**

100gms. Of crude Amalasar sulphur obtained from the market was powdered and put in an Iron/Steel Darvi (spoon) containing 25 gms. (1/4th) cow's ghee. It was subjected to mild heating (sufficient for sulphur melting) stirring with glass rod was done continuously during heating maintaining the temperature constant. On complete melting it was filtered through the cloth into the freshly prepared Bhringaraja juice. The sulphur thus poured become solidified in the juice which when taken out was washed with hot water to clean it from the remnance of the ghee and juice. It was then dried and powdered and the process was repeated for six times more using fresh Bhrngaraja juice.

#### **IInd Experiment:**

The general method of Sulphur collection, heating, melting and filtering in liquid is same in this exp.

Here instead of ghee 25ml.of Karanja taila 25 ml. of Eranda taila mixed together was used as fat media while melting sulphur 100gm. And instead of fresh Bhrngaraja juice as coolong liquid the Goat's milk and Dhattura patra juice was used. The melted sulphur along with oil was filtered through the cloth into the Goat's milk thrice and in Dhattura patra juice thrice. The washing was done after each dipping. In the end the washed sulphur was dried, powdered and weighed.

#### **IIIrd Experiment:**

In this experiment only cooling liquid was changed. Here instead of Bhrngaraja juice, Goat's milk and Dhattura patra juice, the juices of Ghrta Kumari and Palandu were used as cooling liquids. The melted sulphur with ghee was poured into the above liquids through the cloth five times in ach liquid respectively. In the end sulphur was collected, washed, dried and weighed. Each time fresh liquid is used.

#### **IVth Experiment:**

Here sulphur was melted with cow's ghee and cooled in cow's milk, filtering it through the filter cloth. This is a most commonly used method for sulphur purification through out the country.

#### **Results:-**

1. The weight of the purified sulphur by Ist , IInd and IVth method was 85gms.out of 100gms whereas by IIIrd method it was only 75gms out of 100gms.

The total loss varied from 15 to 25gms in these experiments. The reason for higher loss in the IIIrd method was repetition of the process for 10 times whereas in remaining three experiments it was 6 or 7 times. So more handling caused more loss.

2. Some sand particle and other dirty materials were seen after filtering with the cloth, which is also a cause for loss in weight.

### Another set of Experiment

Apart from the above experiments on the various methods of Sodhana treatment both commercially available types of sulphur were also subjected to last shodhana method with an objective to note the effect of this Shodhana method on the crystal structure and the trace elements found present associated with both the varieties of sulphur.

In this set of experiment Amala Sara Sulphur and Nenua-Sara sulphur were obtained from the market and were taken in the same amount as above and were subjected to 4<sup>th</sup> Sodhana method i.e. Cow's ghee and milk method (the commonest and most popular method).

### Observation

On looking there is not any significant change in the colour and form of the crude and Sodhita samples of both types of Sulphur.

### Physico-Chemical Study

This study was done with a view to determine the changes produced in the sulphur by the effect of Sodhana method.

### Percentage purity (by Gravimetric method) of sulphur purified by different methods

<u>Sulphur Samples</u>	<u>Percentage Purity</u>
1. Crude Sulphar	94.75%
2. Godugdha sodhita Sulphur	96.50%
3. Karanjairanda Taila Sodhita sulphur	96.75%
4. Bhrringaraja sodhita Sulphur	97.75%
5. Kumari-Palandu Sodhita Sulphur	98.50%

### Percentage purity (by modified method) of Crude and Sodhita Nenua Sara and Amala Sara Sulphur

Amala Sara Crude	99.6 %
Amala sara Sodhita	99.5%
Nenua sara crude	99.6%
Nanua Sara Sodhita	99.2%

### Melting Point

Amala Sara Crude	118'c.
Nenua sara crude	118'c.
Amala sara Sodhita	121'c.
Nanua Sara Sodhita	121'c.

### Petro-graphic Studies

In this study crude samples of Amala Sara and Nenua Sara Sulphur were found different only in crystalinity i.e. in crude Amalasara Sulphur crystals are found present where as Neuna Sara Sulphur was in massive form. No crystals are seen.

After Sodhana process the crystals were found absent in Amala Sara Sulphur also.

### X-ray diffraction Studies.

All the four samples were subjected to X-ray diffraction studies to further determine their crystal structure.

In this study the crude Amalasar sulphur showed Orthorhombic crystal structure which after Sodhana also remains the same (orthorhombic) but the grain size is found reduced or refined in Sodhita sample.

The Nenuasara variety of Sulphur did not show orthorhombic crystal structure, however, during Sodhana process its structure is transformed to orthorhombic crystals and to reduced grain size thus making both the varieties resemble each other in crystal structure and grain size after Sodhana process.

### **Spectroscopic Studies.**

All the four samples were subjected to spectroscopic studies also with a view to determine their trace elements and to note the other changes after Sodhana process.

The crude samples of Amala sara sulphur is found to contain Al, Fe, Cu and C in abundant and Cr, Mn and Zn in traces. In sodhita samples the elements present in traces were found absent.

In case of Nenuasara sulphur As, Si, C, Cr, Mn, Zn, Al, Fe, Cu are found present in more abundance in both the samples i. e.. in crude and Sodhita forms.

### **Inferences:**

1. In Amala Sara Sulphur the trace elements, which were present in crude samples, have been found removed in Sodhita samples. 2. In Nenuasara sulphur no changes are visual as far as trace elements are concerned. Possibly this may be due to their presence in higher percentage.

### **Discussion:**

In first set of experiment when the crude and processed samples were subjected to percentage purity test chemically, it was observed that the percentage purity of the processed samples has gone up in all the four cases as compared to crude one. But if it is compared between the processed samples it is highest in Kumari-Palandu Sodhita samples suggesting the method more good from this point of view. The next comes the Bhrngaraja Sodhita Sulphur. One of the obvious reasons for this may be the repetition of the process for more times which is suggestive that more the processing higher the percentage of purity of Sulphur.

In other set of experiment where Amalasar and Nenuasara varieties of Sulphur were subjected to Sodhana treatment the percentage purity test did not reveal marked changes in crude and sodhita samples.

The melting point has slightly gone up in both cases after purification i.e. from 118°c to 121°c which is also not very significant.

The petrographic studies revealed the difference in crystallinity of both the varieties i.e. Amalasar and Nenuasara sulphur differ in their crystalline structure. But after Sodhana process both are found to resemble each other. This may be due to the decrease in grain size which is evident from X-ray diffraction studies that the crystal structure (orthorhombic) of Amalasar remains the same even after Sodhana process. This study also suggests that Nenuasara variety which in crude form is massive also shows orthorhombic crystal structure and reduced grain size after purification. This finding is suggestive that from the physical point of view both the types resemble each other after subjecting them to sodhana process. In Nenuasara Sulphur As, Si, C, Cr, Mn, Zn, Al, Fe, Cu are found present in both the samples i.e. in crude and sodhita in

abundance. Thus sodhana process in this case has failed to remove any of these trace materials from the sulphur. One of the possible reasons for this may be their presence in higher percentage in this variety which may require repetition of process for more times to a few of these materials from the purified nenuasara variety.

**Conclusion:-**

Due to the effect of Sodhana process the Amalasar and Nenuasara varieties of sulphur are made to resemble each other as far as their crystal structure (orthorhombic) and grain size are concerned. As regards their percentage purity and melting points Sodhana process did not produce any

remarkable change. The trace elements of Nenuasara variety remained unchanged while in Amalasar variety Cr, Zn and Mn detected as trace elements in crude sample were found absent after Sodhana process.

The different methods of sodhana process applied on Amalasar variety of sulphur significantly changed its percentage purity after completion of sodhana process.

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