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## Preparation and Physico-Chemical Analysis of *Kajjali* with *SamagunaGandhak* and *DwigunaGandhak*

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### ABSTRACT

In this study of preparation and physico-chemical analysis of the *Kajjali* with *Samaguna* (equal quantity) *Gandhak* & *Dwiguna Gandhak* (double quantity) with one part mercury (*Parad*), *Samaguna Kajjali* showed *Nischandratwa* symptoms in 48 hours, where as in *dwiguna Kajjali* it was seen in 46 hours. In analytical study the % of *Parada* in *Ashodhit Parada* was 98.66%, where as in *shodhitaParada* it was 99.38%. The % of *Gandhak* in *Ashodhit Gandhaka* was 98.6%, where as in *shodhit Gandhaka* it was noted 99.08%. M.P. of *Ashodhit Gandhaka* was 116<sup>0</sup>c, but in *shodhit Gandhaka* M.P. was noted 118<sup>0</sup>c.

In physico-chemical analysis of both the *Kajjali* shows –

*SamagunaGandhaka Kajjali* –

- Moisture content - 0.74%
- Mercury - 46.62%,
- Total sulphur content - 53.09%,
- Free sulphur content - 2.46%,
- Ash content - 0.102%,
- Water insoluble ash - completely insoluble,
- Acid insoluble ash - 0.029%

*In DwigunaGandhaka Kajjali* –

- Moisture content - 0.86%,
- % of Mercury - 38.12%,
- Total sulphur content - 63.04%
- Free sulphur content - 5.30%
- Ash content - 0.128%



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Water insoluble ash – completely insoluble,  
Acid insoluble ash – 0.32%

## **KEYWORDS**

*TheKajjali-Dwiguna (double) Gandhaka, The Samaguna (equal)*



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## INTRODUCTION

In many textbooks of Rasashastra the Kajjali is described<sup>2,3,4,13,14,15,16</sup>. The Kajjali can be prepared by taking Gandhaka i.e. sulphur in different quantities with Parada i.e. Mercury. As in Rasatarangini 6<sup>th</sup> chapter 107<sup>th</sup> shloka it is stated that Mercury (Parada) can be mixed with equal part of Gandhaka or double or triple or half part and triturated till it becomes<sup>15</sup>.

So, to see the difference in analysis of Kajjali prepared with equal & double quantity of Gandhaka this study was undertaken.

### AIMS

- 1) To prepare the Kajjali with equal & double quantity of Gandhaka with one part of Mercury.
- 2) To standardize the Samaguna Kajjali and Dwiguna Kajjali.

### OBJECTIVES

- 1) Preparation of Samaguna Kajjali and Dwiguna Kajjali.
- 2) Physico chemical analysis of Samaguna Kajjali and Dwiguna Kajjali.

## MATERIALS AND METHODS

- 1) Material (Stepwise) – 1) For Sudhachurna shodhan<sup>15</sup>  
-250 gm Ashuddha Sudha churna.  
1 Liter Distilled Water.

- Tulayantra (Weighing balance), Khalva Yantra, Vastra, plate, spoon, water, steel vessel, measuring jar, glass vessel etc.

### 2. For Parada Shodhan with Sudha<sup>15</sup>

Ashodhit Parada (Mercury) - 200 gm.  
Shodhit Sudha (Lime) Ca(OH)<sub>2</sub> - 200 gm.

### 3. For Parada Shodhan with Rason & Saindhava Lavan<sup>15</sup>

Ashodhit Parada (Hg) = 194 gm.  
Saindhav Lavana (Salt. NaCl) = 97 gm.

Lasuna (Allium sativum) = 194 gm.

### 4. For Gandhaka Shodhan<sup>15</sup>

Gandhaka - 500 gm.  
Goghrita (Cow's Ghee) - 1500 gm.  
Godugdha (Cow Milk) - 3 Liter

### 5. For preparation of Samaguna Kajjali<sup>15</sup>

Shuddha Parada - 90 gm.  
(1 Part)  
Shuddha Gandhaka - 90 gm.  
(1 Part)

### 6. For preparation of Dwiguna Kajjali<sup>15</sup>

Shuddha Parada - 90 gm.  
(1 Part)  
Shuddha Gandhaka - 180 gm.  
(2 Part)

### METHODS:-

1. Pharmaceutical Study.
2. Analytical Study.

### 1. Pharmaceutical Study –



a. Collection and authentication of raw materials.<sup>4,5,6,7,9.</sup>

b. Parada Shodhan<sup>15</sup>

i. Sudha Shodhan.<sup>15</sup>

ii. Parada Shodhan with Sudha.<sup>15</sup>

iii. Parada Shodhan with Rason and Sindhava Lavan.<sup>15</sup>

c. Gandhaka Shodhan<sup>15</sup>

d. The Kajjali Preparation<sup>15</sup>

i. Samaguna Gandhak Kajjali.

ii. Dwiguna Gandhaka Kajjali.

a) Sample of raw Parada, raw Gandhaka, Sindhavalavana, Sudha (lime), Godhgda, Goghruva were collected from pharmacy of Late Kedari Redekar Ayurvedic College and authenticated from Rasashastra department of Late Kedari Redekar ayurved college, Gadhinglaj. Rasona was authenticated from Dravyaguna department of Late Kedari Redekar ayurved college .

b) Parada Shodhana<sup>15</sup> :-

i. Sudha Shodhan Ref. Rasatarangini 11/210.

Date of commencement -22/06/2012.

Date of Completion -22/06/2012.

Asuddha Sudha Churna -250 gm.

Distilled Water – 1 Liter.

Equipments mentioned in materials.

Procedure –

Sudha was pounded well till it got turn into powder form in khalvayantra. One liter water and Sudha taken in stainless

steel pot, stirred well and filtered with cloth in glass vessel. Filtered Sudha was kept for sedimentation for about 7 hours. Upper portion of liquid is decanted and settled Sudha was dried in sunlight, then solid dried Sudha was collected.

ii. Parada Shodhan with Sudha<sup>15</sup> –

Ref. Rasatarangini 5/27-30.

Date of Commencement -23/06/2012

Date of Completion -29/06/2012

Ashodhit Parada – 200 gm.

Shodhit Sudha – 200 gm.

Procedure –

Weighed quantity of Ashodhit Parada and Shodhit Sudha were triturated continuously for 4-5 hours / day in khalavayantra for 7 days. On 8<sup>th</sup> day triturated for 1 hour and Sudha turned to grey, Parada was got collected in middle of khava, it was shining in nature. It was filtered through cloth for collection of Parada.

iii. Parada Shodhan with Rasona & Sindhav Lavana

Ref. Rasatarangini 5/27-30.

Date of commencement – 02/07/2012

Date of completion – 13/07/2012

Procedure –

Ashodhit Parada – 194 gms.

Sindhav Lavana – 97 gms.

(Nistusha) Lashuna – 194 gms.

Procedure –



Parada & Nistusha Lashuna were taken in equal part & Saindhava Lavana added it's half part and triturated well till the kalka got turned to black (Krishna) colour.

Then it was washed with water & clean Parada was collected.

c) GandhakaShodhana<sup>15</sup> –

Ref. – Rasatarangini 8/7-12.

Date of commencement – 18/07/2012

Date of completion – 20/07/2012

Procedure –

Gandhaka – 500 gm.

Godugdha – 3 Liter.

Gandhaka was powdered finely in Khalvayantra. Gandhaka was taken in to iron cauldron smeared with goghrita & subjected to Mandagni. Gandhaka was stirred with spoon intermittently. When Gandhaka melted completely, it was poured into a vessel containing godugdha covered by using cloth for filtration on the mouth of vessel.. Gandhak from godugdha, washed thoroughly with hot water & dried under shade. This procedure was repeated for 3 times.

d)Kajjali Preparation.<sup>15</sup> –

i. Preparation of SamagunaKajjali.

Ref. – Rasatarangini 2/27-28

Date of commencement – 6/08/2012

Date of completion – 13/08/2012

Procedure–

Sudha Parada – 90 gm. (1 part)

Shudha Gandhaka – 90 gm. (1 part)

First shuddha Gandhaka was taken in the khalvayantra & made into fine powder. Then equal quantity of shuddha Parada was added & trituration was carried out 8 hours daily for 7 days, till it become black in colour and Nischandra i.e. no shining particles were observed in it.

ii. Preparation of DwigunaKajjali<sup>15</sup>

Ref. - |Rasatarangini 2/27-28

Procedure –

Sudha Parada – 90 gm. (1 part)

Sudha Gandhaka – 180 gm. (2 part)

First shuddha Gandhaka was taken into khalva & powdered well and then Parada was added & triturated 8 hours/ daily for 7 days till it got shiningless black in colour.

## 2. Analytical Study –

1.% of Mercury – by A.A.S<sup>17</sup>

Atomic Absorption Spectro Photometer.

2.Determination of Melting Point <sup>1</sup>

One gm of ashuddha Gandhaka& 1 gm. of shodhit Gandhaka taken in different porcelaine crucible and subjected to an electrical muffle Furnace. Temperature was noted from time to time, till melting point was determined.

3.Bulk Density<sup>1</sup>

4.% of sulphur<sup>1</sup>

5.Siddhilaksana of the Kajjali<sup>15</sup>

6. Determination of moisture content <sup>1</sup>



7. Free sulphur<sup>1</sup>
8. Total Ash Value<sup>1</sup>
9. Water insoluble Ash<sup>1</sup>
10. Acid insoluble Ash<sup>1</sup>

## OBSERVATION AND RESULTS

Pharmaceutical observation and Results.

### 1. Sudha Shodhan –

- a. Shodhit Sudha was brighter in colour than ashodhitSudha.
- b. Total Loss = 30 gm.

### 2. Parada Shodhan with Sudha

Luster of Parada was increased.

Total loss = 6 gm.

Loss was due to Jalagati.

### 3. Paradashodhan with Rasona and saindhava.

On 12<sup>th</sup> day (last day) Parada completely mixed with Rasona Kalka. After 60 hours of Mardana(trituration) Rasona kalka got turned into blackish green and most of the Parada got collected in centre of the khalva.

Total loss – 9 gm.

Loss of Parada was due to Jalagati & Hansagati while washing the Parada with water.

### 4. Shodhan of Gandhaka –

After 3 days of procedure Gandhaka was yellow, granular, solid mass obtained in godugdha.

Total loss – 25 gms.

Loss is due to physical impurities which were remained on cloth after filtration.

### 5. Preparation of Samaguna Kajjali

After 48 hours - Nischandra (shiningless)

Black colour

Kajjali was seen.

Total loss – 4 gms.

Loss was due to Mardana Procedure

### 6. Preparation of Dwiguna Kajjali

After 46 hours –

Nischandra(shiningless)

Black colour

Kajjali is seen.

Total loss – 6 gms.

Loss was due to Mardana Procedure

## ANALYTICAL STUDY OBSERVATION AND RESULTS

### A. Analysis of AshodhitParada and ShodhitParada :-

1. Ayurvedic Parikshan :-

Table A.1 Ayurvedic Parikshana of Parada

Sr No.	Name of test	AshodhitParada	ShodhitParada
1	Shabdha	-	-
2	Sparsha	Sheeta	Sheeta
3	Rupa	Silvery color	Shiny Silvery Color
4	Rasa	-	-
5	Gandha	-	-
6	Weight	200 gm	185 gm

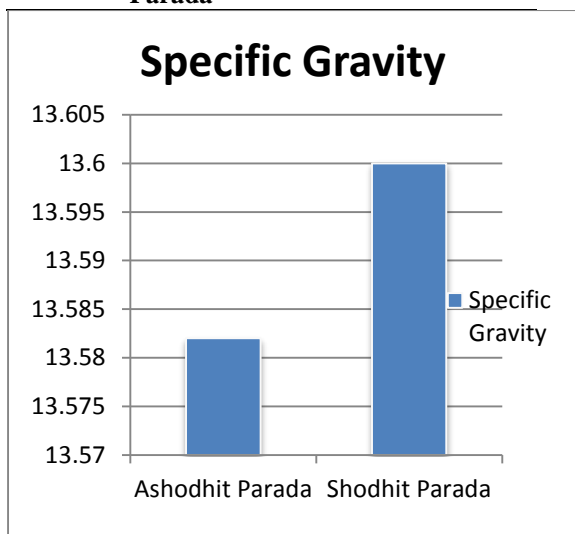
2. Specific Gravity / Density of Parada

Table A.2 Specific Gravity of Ashodhit and ShodhitParada

Sr No.	Sample	Specific Gravity
1	Ashodhit Parada	13.582 gm/cm <sup>3</sup>



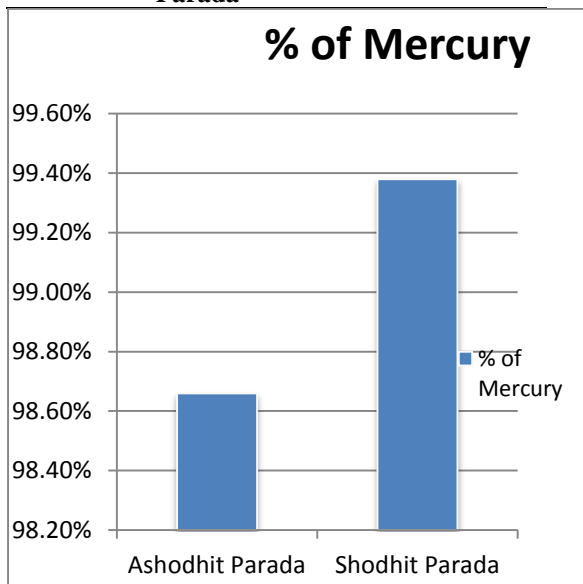
2	<b>Shodhit Parada</b>	13.60	m/cm <sup>3</sup>
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3.% of Mercury by Atomic Absorption Spectrophotometry in Ashodhit and ShodhitParada

**Table A.3** % of Mercury by A.A.S Ashodhit and ShodhitParada

Sr.No.	Sample	Result%w/w
1	Ashodhit Parada	98.66%
2	Shodhit Parada	99.38%



## B Analasis of Ashodhit Gandhaka and Shodhit Gandhaka

## 1. Ayurvedic Parikshan

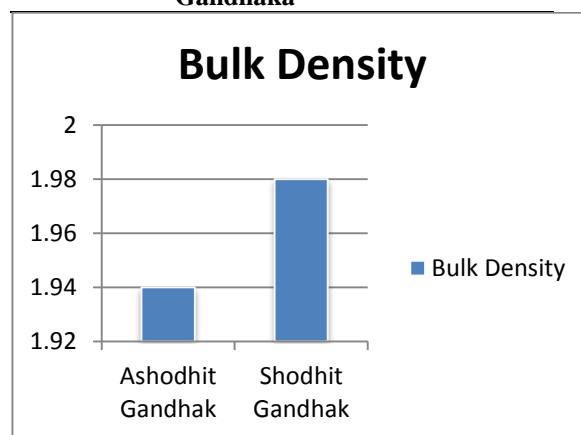
**Table 1** AyurvedicParikshana of Gandhaka

Sr. No.	Name of test	AshodhitG andhaka	ShodhitG andhaka
1	<b>Shabdha (sound)</b>	-	-
2	<b>Sparsa(Touch)</b>	Ruksha	Singdha
3	<b>Rupa (For look)</b>	Brownish yellow	Shine, Faint lemon yellow
4	<b>Rasa (Taste)</b>	-	-
5	<b>Gandha (Odour)</b>	UgraGandha	UgraGandha
6	<b>Weight</b>	5	5

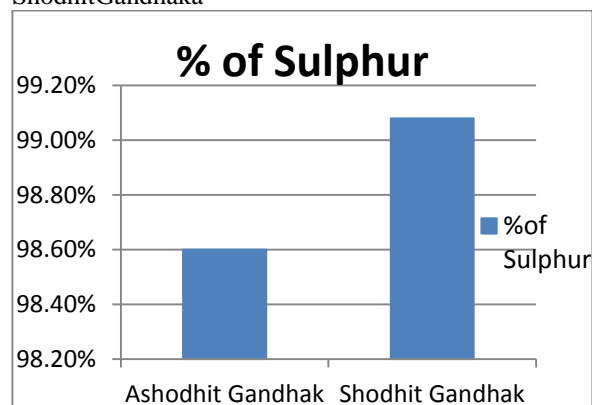
## 2. Bulk Density

**Table.2** Bulk Density of Ashodhit and ShodhitGandhaka

Sr.No.	Sample	Bulk Density
1	Ashodhit Gandhaka	1.94 gm/cm <sup>3</sup>
2	Shodhit Gandhaka	1.98 gm/cm <sup>3</sup>



**Table 3** % of Sulphur of Ashodhit and ShodhitGandhaka

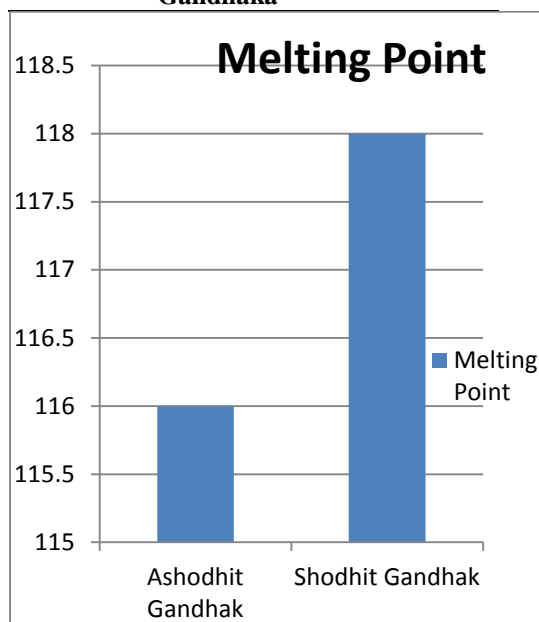






**Table.4** Melting Point of Ashodhit and Shodhit Gandhaka

Sr.No.	Sample	Melting Point
1	Ashodhit Gandhaka	116°C
2	Shodhit Gandhaka	118°C



### 5 Moisture content of Ashodhit Gandhak and Shodhit Gandhak

Sr.No	Sample	Moisture Content
1	Ashodhit Gandhak	98.6%
2	Shodhit Gandhak	99.08%

### 6 Solubility in Water

**Table.6** Solubility in water of Ashodhit and Shodhit Gandhaka

Sr No.	Sample	Result
1	Ashodhit Gandhak	Insoluble
2	Shodhit Gandhak	Insoluble

### C. Analysis of SamagunaKajjali and DwigunaKajjali :-

1. :-AyurvedicParikshana of SamagunaKajjali and DwigunaKajjali

a. AyurvedicParikshan

SamagunaKajjali was prepared by

tritulating equal amount of Parada and Gandhaka as described in Material and method.

b. DwigunaKajjali was prepared by trituration of Parada and double amount of Gandhaka as described in Material and method.

**Table.1** AyurvedicParikshana of Samaguna Kajjali and Dwiguna Kajjali

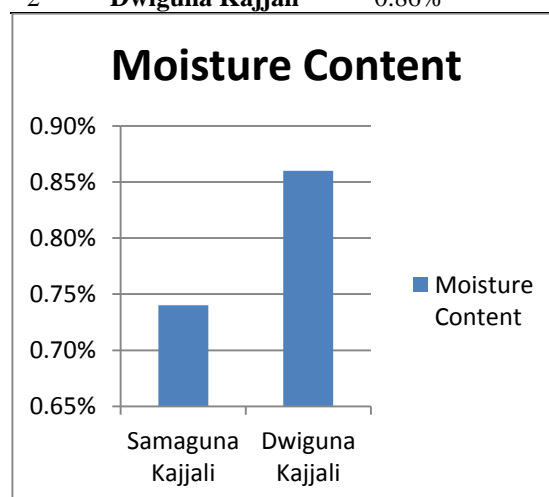
Sr No.	Name of test	Samaguna Kajjali	Dwiguna Kajjali
1	Shabdha	-	-
2	Sparsha	Shlakshna	Shlakshna
3	Rupa	Black color Powder	Black color Powder
4	Rasa	-	-
5	Gandha	Typical Odor	Typical Odor
6	Rekhapurnatva	Yes	Yes
7	Nischadrikatva	Yes	Yes
8	Weight	175 gms	263 s

### 2. Moisture Content Samaguna Kajjali

and Dwiguna Kajjali :-

**Table 2** Moisture Content Samaguna Kajjali and Dwiguna Kajjali

Sr No.	Sample	Moisture Content
1	Samaguna Kajjali	0.74%
2	Dwiguna Kajjali	0.86%



### 3. % of Mercury in Samaguna Kajjali and Dwiguna Kajjali



**Table 3** % of Mercury in Samaguna Kajjali and Dwiguna Kajjali

Sr No.	Sample	Results %
1	Samaguna Kajjali	46.62%
2	Dwiguna Kajjali	38.12%

4. % of Sulphur in Samaguna Kajjali and Dwiguna Kajjali

**Table 4** % of Sulphur in Samaguna Kajjali and Dwiguna Kajjali

Sr No.	Sample	% of Sulfur
1	Samaguna Kajjali	53.09%
2	Dwiguna Kajjali	63.04%

5. Free Sulphur in Samaguna Kajjali and Dwiguna Kajjali

**Table 5** Free Sulphur Content in Samaguna Kajjali and Dwiguna Kajjali

Sr No.	Sample	Free Sulphur
1	Samaguna Kajjali	2.46%
2	Dwiguna Kajjali	5.30%

6. Ash content in Samaguna Kajjali and Dwiguna Kajjali :-

**Table.6** Ash content in Samaguna Kajjali and Dwiguna Kajjali

Sr No.	Sample	Ash Content
1	Samaguna Kajjali	0.102%
2	Dwiguna Kajjali	0.128%

7. Water insoluble Ash in Samaguna Kajjali and Dwiguna Kajjali :-

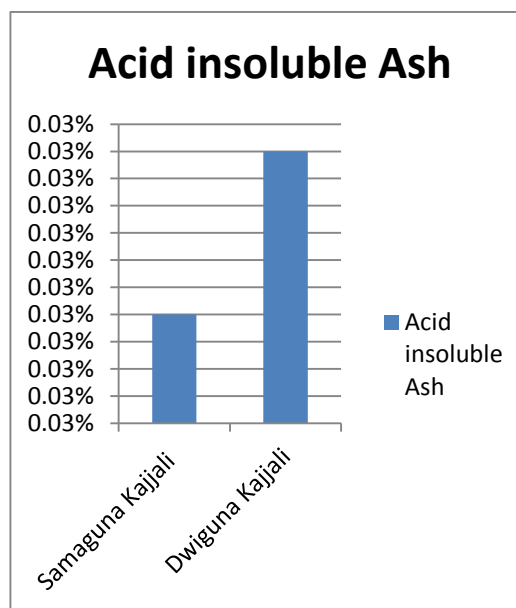
**Table 7** Water insoluble Ash in Samaguna Kajjali and Dwiguna Kajjali

Sr No.	Sample	Water insoluble ash
1	Samaguna Kajjali	Completely insoluble
2	Dwiguna Kajjali	Completely insoluble

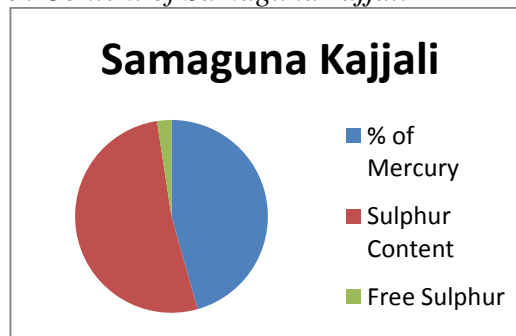
8. Acid insoluble ash in Samaguna Kajjali and Dwiguna Kajjali

**Table.8** Acid insoluble ash in Samaguna Kajjali and Dwiguna Kajjali

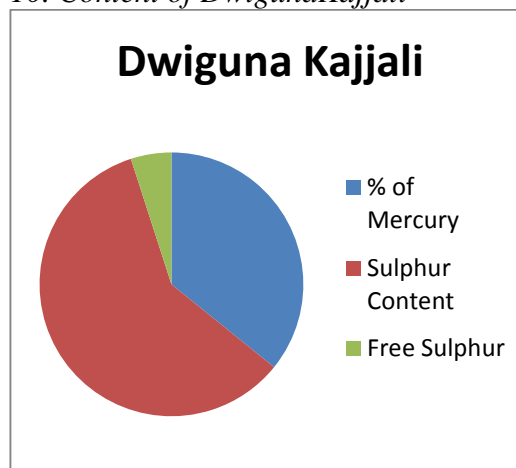
Sr No.	Sample	Acid insoluble Ash
1	Samaguna Kajjali	0.029%
2	Dwiguna Kajjali	0.032%



9. Content of SamagunaKajjali



10. Content of DwigunaKajjali



**DISCUSSION**



## Pharmaceutical Study

In preparation of study of Samaguna Kajjali after 48 hours of Mardana (trituration) the Kajjali became Nischandrika i.e. Absence of any shining particle indicates proper formation of the Kajjali. In the preparation of dwiguna Kajjali to become Nischandrika it took 46 hours for Mardana.

## Analytical Study

In physico-chemical analysis of the Kajjali – following points are seen.

**Table 1** Physico- chemical Analysis of theKajjali

Sr. No.	Tests Names	Samaguna Kajjali	Dwiguna Kajjali
1	<b>Appearance</b>	Slightly dark black colour powder	Black colour powder
2	<b>Moisture content</b>	0.74%	0.86%
3	<b>% of Mercury</b>	46.62%	38.12%
4	<b>Total Sulphur content</b>	53.09%	63.04%
5	<b>Free sulphur content</b>	2.46%	5.30%
6	<b>Ash content</b>	0.120%	0.128%
7	<b>Water insoluble ash</b>	Completely insoluble	Completely insoluble
8	<b>Acid insoluble ash</b>	0.029%	0.32%

## CONCLUSION

### Pharmaceutical Study

Parada shodhana by triturating in Sudha, Rasonakalka and saindhalavana was much time consuming (60 hours).

For samaguna Kajjali preparation it took 48 hours, where as in Dwiguna Kajjali it

took 46 hours for getting Nischandralaxana.

### Analytical Study

By shodhana of Parada, % of mercury increases and brightness of Parada also increased. By shodhana of Gandhaka the % of sulphur, bulk density and melting point were increased. Dwiguna Kajjali had more total sulphur content, free sulphur, moisture content, ash content, acid insoluble ash content and less % of mercury as compared to samaguna Kajjali.



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