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Preparation of *Tamra Bhasma* by classical method

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ABSTRACT

Tamra Bhasma and *Rasakalpas* containing *Tamra Bhasma* are used in treatment of various diseases. In *Rasagranthas* especially in *Tamra Bhasma Amritikarana Samskara* is said to remove remaining *Doshas* of *Tamra Bhasma*. It is said to be Aim of this work is to prepare proper *Tamra Bhasma* by using classical method and to develop manufacturing procedure of *Tamra Bhasma*. For *Samanya Shodhana Tamra* was heated and after red hot it was quenched for 7 times in *Tila Taila, Takra, Gomutra, Kanji* and *Kulattha Kwatha* in order. During *Shodhana* color of *Tamra* became black. After *Samanya Shodhana* weight of *Tamra* was 390 gm. At the end of *Samanya Shodhana* there was 13.33% loss of weight in *Tamra*. *Vishesha Shodhana* was done by *Swedana* in *Gomutra* in *'Dola-Yantra'*. After *Vishesha Shodhana* 338 gm *Tamra* obtained. *Tamra Bhasma* is very harmful if it's *Shodhana* and *Marana* is not done properly. At the end of *Vishesha Shodhana* total loss in weight of *Tamra* was 12 g (3.42%). pH of *Gomutra* was increased from 9 to 9.5. In this *Tamra Bhasma* was prepared by *Kapota Puta*. In this study after 9 *Putas* the *Bhasma Lakshana's* were attained. Maximum temperature found during *Tamra Bhasma* preparation is 550°C. After 9th *Puta* 630 gm *Tamra Bhasma* was obtained. The average weight loss of *Tamra* after *Marana* was 13.59%. When *Bhasma* was properly formed it was black in color. In *Amritikarana* procedure the maximum temperature was 580°C. After *Amritikarana* weight of *Tamra Bhasma* was 608 gm. Total weight gain after *Amritikarana* was 1.33 %.

Key words: *Tamra Bhasma, Rasakalpa, Amritikarana, Shodhana, Marana.*

INTRODUCTION

Rasa Shastra is a branch of Ayurveda, which deals with the uses of *Rasaushadhi* and drugs originated mainly from metals and minerals substances after going through systemic procedure. The *Rasaushadhi* are the back bone of the Ayurvedic therapeutics. It includes *Rasachikitsa* is the best therapy among others due to quicker recovery from disease and effective in even very small doses.[1]

Nowadays due to increased demand of Ayurvedic preparations and increased global response towards Ayurvedic system of medicine, the production of standard, effective, genuine, safe drugs in required quantity and utmost quality is a challenge for processing units of Ayurvedic drugs. So, the need of an hour is to do research in Ayurvedic drugs for the large quantity productions with high standard quality.[2]

Rasakalpas containing *Tamra Bhasma* is used in treatment of various diseases since *Charaka Samhita* for example - *Arogyavardhani Vati, Hridayarnava Rasa, Prabhakara Vati, Kalyana Sundara Rasa, Laxmivilasa Rasa, Nityananda Rasa. Tamra Bhasma* is widely used in the treatment of *Kushtha* (skin

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disorders), *Kshaya* (general debility), *Pandu* (Anaemia), *Sthaulya* (obesity). *Tamra Bhasma* is one of the most useful metallic preparations. It is said to be very harmful if it's *Shodhana* and *Marana* is not done properly. More than 42 *Doshas* of *Tamra* were told by various texts of *Rasashastra* indicating how harmful *Tamra* is when used without proper *Shodhana* and *Marana*. In *Rasagranthas* especially in *Tamra Bhasma Amritikarana Samskara* is said to remove remaining *Doshas* of *Tamra Bhasma*. It is capable of curing all diseases of *Pitta-Kapha Dosa Pandu, Udara, Arsha, Garavisha, Kushtha, Kasa, Swasa, Kshaya, Pinasa, Amlapitta, Shopha, Krimi, Shoola*. So, the aim is to prepare *Tamra Bhasma* by using classical method and to develop manufacturing procedure of *Tamra Bhasma*.[3-6]

Materials and Methods

A. *Samanya Shodhana*

Raw winding copper wire (99% pure) was procured from local market. *Takra, Kanji* and *Kulattha Kwatha* were prepared in the department of Rasashastra & Bhaishajya Kalpana. *Changeri* leaves were collected from herbal garden. *Gomutra*, *Tila taila, Hingula* and *Gandhaka* were procured from local market.

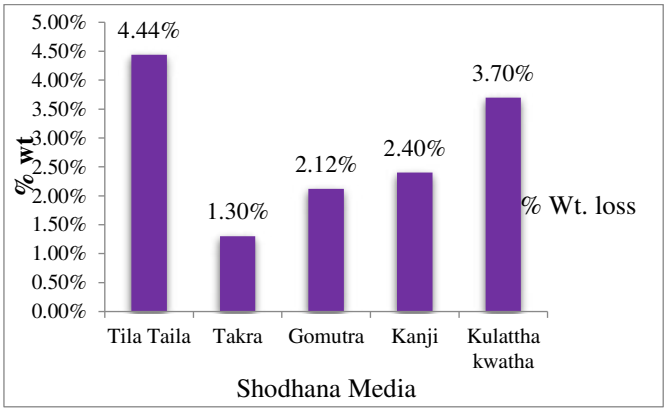
Copper wire was cut & folded in loop. 450 gm raw *Tamra* wire was taken on long handled stainless-steel ladle and heated on *Angardhanika* until its red hot and quenching them subsequently into *Tila Taila* (*Sesamum indicum*), for seven times. After cooling, Copper wire was taken out from the vessel. This procedure was repeated with *Takra* (buttermilk), *Gomutra* (cow urine), *Kanji* (sour gruel) and *Kulattha Kwatha* (decoction of seeds of *Dolichos biflorus* Linn.) for seven times in each. After complete heating it was immediately quenched in liquid media. After collection of *Tamra* from the liquid media it was then washed with hot water and dried.

Same procedure was repeated for 7 times. Each time fresh and same amount of liquid media was taken in stainless steel bowls. Every time fresh, gravimetrically same amount of media was taken.[7]

Table 1: Changes in media after *Samanya Shodhana.*

Media	Media quantity (in litres)		pH of media		Colour of media	
	Initial	Final	Initial	Final	Initial	Final
Tila Taila	10	9.5	6	6	Yellowish	Brownish
Takra	10	9	3	3	Milky white	White
Gomutra	10	8.5	9	8	Light Brown	Dark brown
Kanji	10	9	2.8	4	White	Greyish
Kulattha Kwatha	10	9.5	7.4	7.5	Brown	Blackish brown

Figure 1: Avg. weight loss % of *Tamra* during *Samanya Shodhana*



B. *Vishesha Shodhana*

Procedure: *Vishesha Shodhana* of *Tamra* was done as mentioned in *Rasa Ratna Samucchya*.[8] 350 gm of *Samanya Shodhita Tamra* was taken; in an iron pot containing 4 litres of *Gomutra*. *Agni* was imparted to the pot for duration of 3 hours. Then *Tamra* was washed in warm water, dried and weighed.

Observations: Initially when the *Gomutra* started to boil there was bubbling, later there was froth formation. The temperature was 540°C. The froth started to ooze out of the pot after about 20 minutes.

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To overcome this water was sprinkled on it. About 1½ and 2½ hours later ½ litre of warm *Gomutra* was added each time. After 3 hours put off and on cooling the *Tamra* was removed and washed in warm water. *Tamra* became finer after *Vishesha Shodhana*. Colour turned to bright metallic with blackish particles. It became more brittle.

C. *Marana* of *Tamra*

Marana of *Tamra* was as per method mentioned in Rasa Tarangini.[9] Very first cut the stem part from collected fresh *Changeri* leaves then wash it from pure water. Cutting leaves were kept in stone mortar-pestle for crushing in sufficient amount there after crushed leaves were squeezed through cotton cloth on stainless steel vessel and this collected juice was used for *Shodhana*. 300gm *Shuddha Tamra* was mixed in 75 gm *Hingulottha Parada* & *Pishti* was prepared. This *Pishti* was triturated with 300 gm *Shuddha Gandhaka* & *Kajjali* was prepared. This mixture and *Changeri Swarasa* was levigated in stone mortar and pestle until it formed a thick paste and suitable for making pellets.

***Chakrika Nirmana*:** Small amount of levigated doughy mass was made into round, flat pellets. The prepared pellets were kept on plastic sheet for sun drying. Dimension of one pellet was - Diameter 2-2.5 cm, thickness 0.2 – 0.3 cm and weight 2.23 gm.

After proper drying of *Chakrika* it was weighed and kept in an earthen saucer, this saucer was covered by another saucer and then junction was sealed by clay smeared cloth in three consecutive layers and again allowed for complete drying. Thereafter, the said *Sharava* was kept on fire containing commercially made cow dung cakes, through *Puta*. 2/3rd of pit was filled with cow dung cakes and sealed *Sharava Samputa* was placed in pit and upper space is filled with remaining cow dung cakes. Fire is set in all four sides and middle of the pit. Temperature was recorded by a digital pyrometer from beginning.

Maximum temperature during puta was 550°C. After self-cooling the *Sharava Samputa* was taken out and opened. The *Tamra Bhasma* was collected and weight. Again, this procedure was repeated for 9 times to get desired quality of *Bhasma*. After 7th*Puta, Bhasma* was started to be floated on water. After 9th*Puta* 630 gm *Tamra Bhasma* was obtained. After 9th *Puta Tamra Bhasma* passed all classical parameters of *Bhasma Pariksha*.

Table 2: Weight loss/gain during *Puta*

No. of *Puta*	Wt. after each *Puta* + *Kajjali* (gm)	Weight of *Chakrika* before *Puta* (gm)*	*Changeri Swarasa* (ml)	Wt. (gm) of cow dung cake** used	Wt. (gm) of *Chakrika* After *Puta*	Wt. loss of *Tamra Bhasma* in %
1.	300 + 375	610	180	1750	580	4.91
2.	580 + 375	950	250	2000	790	16.84
3.	790 + 375	1070	280	2250	940	12.14
4.	940 + 375	1245	310	2550	1030	17.26
5.	1030 + 375	1400	330	2820	1180	15.71
6.	-	1190	280	3250	1100	7.56
7.	-	1090	240	3550	1012	7.15
8.	-	1020	220	3100	890	12.74
9.	-	875	200	3050	630	28

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*1st to 5th *Puta* 375 gm *Kajjali* was added.

**each cow dung cake average wt. is 255 gm.

Total average weight loss of *Tamra* after *Puta* in % = 13.59 %

Table 3: Observations in pellets during *Marana*

No. of *Puta*	Colour of pellets after *Puta*	Pellets on Touch	Colour	Odour	Taste	Touch
1st	Black pellet	Cracks and rough	Greyish	Sulphur	Bitter, sour, Irritative	Rough
2nd	Dark black, Yellowish spot present in some pellet	Rough	Greyish	Sulphur	+ + +	+ + +
3rd	Black Shiny	Easily Breaks	Greyish brown	Sulphur	+ + +	+ +
4th	Black Shiny and reddish spot present in some pellet	Soft	Greyish	Sulphur	+ +	+ +
5th	Greyish	Soft	Greyish black	Sulphur	+	+
6th	Shiny greyish	Cracks, Break on some force	Greyish black	Sulphur	+	+
7th	Greyish black, brown and white spot present in some	Breaks easily	Black	Sulphur	Slightly metallic	+
8th	Black	Breaks easily	Black	Sulphur	Slightly metallic	Smooth
9th	Black	Breaks easily	Dark Black	Sulphur	No taste	Smooth

Table 4: Temperature pattern of *Puta* at interval of 15 minutes.

No. of *Puta*	Time (in Hrs.) / temperature (in °C)											Maximum temperature in each *Puta* (°C)
	0:15	0:30	0:45	1:00	1:15	1:30	1:45	2:00	2:15	2:30	2:45	
1st	80	120	145	150	250	270	200	170	155	110	90	270
2nd	85	150	220	270	316	310	260	240	170	130	110	316
3rd	78	110	150	210	335	375	330	310	270	230	100	345
4th	75	130	170	220	310	355	375	340	290	245	145	375
5th	90	145	210	250	330	380	385	355	305	255	170	385
6th	88	120	220	300	385	400	365	330	280	210	150	400
7th	95	135	210	330	370	435	385	310	260	200	175	435
8th	85	120	215	350	410	485	390	330	250	290	160	485
9th	88	150	255	335	430	485	550	425	385	270	175	550

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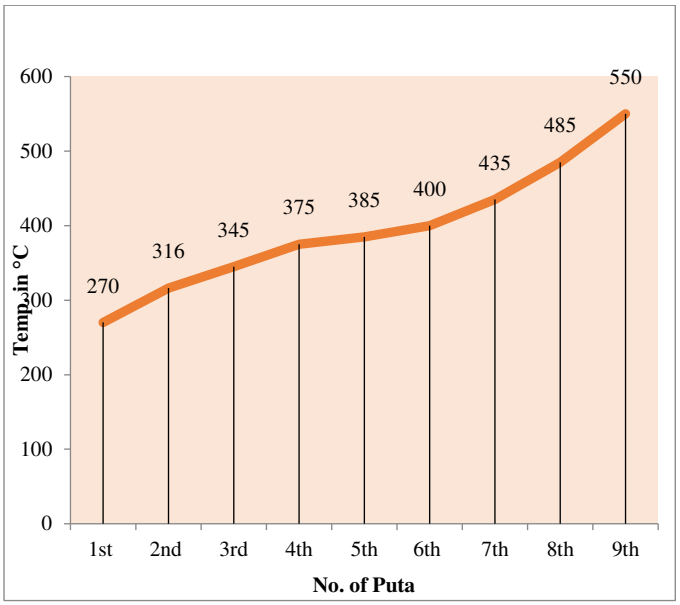
Average temperature pattern	84.88	131.11	199.44	268.33	348.44	385	360	312.22	262.77	215.55	141.66	390.11

Figure 2: Maximum temperature patterns followed in *Puta*



D. *Amritikarana* of *Tamra*

Amritikarana of *Tamra* was done as per reference of Rasa Darpana.[10]

Procedure: 600 gm *Tamra Bhasma* was triturated by giving *Bhavana* of *Nimbu Swarasa* (Q.S.). After proper trituration, Pellets were prepared and dried in sunlight. *Surana Kanda* weighing 4.250 kg was cut into two halves horizontally. A round pit was made in middle of both the halves. Dried bolus was kept in it and the two halves were joined together. A thick layer of *Kapadamitti* (mud smeared cloth) was done over it. It was then dried in sunlight and kept in *Puta*. After *Swangasheetikarana* it was removed, the Pellets inside was taken out, triturated and stored in airtight glass bottle.

Observations: 3 hours of trituration is required for the consistency of Pellets formation. After *Putapaka*, tuber of *Surana* was completely burnt, converted into black color. Pellets inside was black and breakable by slight pressure. After trituration it converted to black, smooth and fine powder. The temperature was 580°C.

Precautions: Pellets should be dried well. Pit in the *Surana Kanda* should be prepared perfectly. After joining the two halves of the *Surana Kanda* should coincide with each other. There should be no free space in between. Layer of mud smeared cloth should be thick enough. After obtaining *Bhasma*, it should be triturated well and stored in airtight glass container.

Results & Discussion

After *Samanya Shodhana* weight *Tamra* was 390 gm. At the end of *Samanya Shodhana* there was 13.33% loss of weight in *Tamra*. The reason for the loss might be predicted as the removal of impurities from the *Tamra*. The pH of above media before *Nirvapana* was 6, 3, 9, 2.8 and 7.4 respectively. In the first and last media the pH was towards neutral, the 2nd and 4th media were acids whereas the 5th one was alkaline in pH.

After *Shodhana*, the pH of the media was 6, 3, 8, 4 and 7.5 for *Taila*, *Takra*, *Gomutra*, *Arnala* and *Kulatta Kwatha* respectively. The colour change was observed in the media, yellow coloured *Tila Taila* turned to brownish. *Takra* which was milky white turned to greenish white colour. *Gomutra* which was light brown turned to dark brown with black particles. *Arnala* colour was white, turning to greyish. The *Kulattha Kwatha* which was brown turned to blackish brown. The black particles might be the carbon particles which were formed during heating. The change in pH and colour change in the media is suggestive of the release of impurities into media. During *Shodhana*, color of *Tamra* became black. This is because during red hot state *Tamra* (copper) reacts with atmospheric oxygen and steam to form Cupric oxide (CuO) which is black in color, and reaction of *Tamra* occurs mainly on surface, so *Tamra* flakes became black after *Shodhana*.

Vishesha Shodhana was completed within 3 hours. It was done by *Swedana* by *'Dola-Yantra'*. Quantity of *Gomutra* reduced from 4 liters to 2½ liters. After

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Vishesha Shodhana 338g *Tamra* obtained. At the end of *Vishesha Shodhana* total loss in weight of *Tamra* was 12g (3.42%). pH of *Gomutra* was increased from 9 to 9.5. In this process of *Swedana* "thermochemistry" is involved along with the composition of *Gomutra* whose components may pierce through the micro pores and cracks created during *Samanya Shodhana* and may produce the required change specific to *Tamra* for further process.

As per *Aptopadesha*, the *Tamra Bhasma* if subjected to *Gaja Puta*, becomes hard which can be assumed as the *Punarbhava* of *Tamra*. Hence in the current study, *Tamra Bhasma* was prepared by *Kapota Puta*. In the quoted reference 3 *Gaja Putas* are told. But, in Ayurvediya Rasashastra text by Prof. Siddhinandan Mishra and Rastaragini says, the *Putas* should be given until the *Bhasma Lakshanas* are attained. In this study by 9 *Putas* the *Bhasma Lakshana's* were attained. *Changeri Patra Swarasa* was used as *Bhavana* media for *Marana* of *Tamra*. Because of its anti-toxic activity. It removes toxicity (*Vishadosha*) of *Tamra.*[11]

In this study the total number of *Puta* using traditional system of heating for *Tamra Bhasma* preparation is: 9. After 9th*Puta Bhasma* passed all classical *Bhasma Pariksha* parameters. Maximum temperature found during *Tamra Bhasma* preparation is 550°C. After 9th*Puta* 630 gm *Tamra Bhasma* was obtained. The average weight loss of *Tamra* after *Marana* was 13.59%. When *Bhasma* was properly formed it was black in color. It can be said that *Tamra Bhasma* is Cuprous Sulphide, because sulphur is used for incineration and that too in absence of oxygen (in *Sharava Samputa*).

In *Amritikarana* procedure the maximum temperature was 580°C. After *Amritikarana* weight of *Tamra Bhasma* was 608 gm. Total weight gain after *Amritikarana* is 1.33 %. *Tamra Bhasma* occupied a significant role in the Ayurvedic therapeutics. Modern research workers have found out that there is a special role of copper in lipid metabolism. It is the drug of choice in the treatment of many diseases. The pharmaceutical procedures of *Bhasma* carried out with a medicinal drug with the intention of getting it purified and made them free from toxicity and suitable for the body. If these procedures were done improperly or not done as per classical guidelines, it may cause toxicity. I have been tried to prepare *Tamra Bhasma* by classical method. We can conclude that ancient text has mentioned proper method for preparation of *Bhasma* and *Bhasma Pariksha* (Standardisation techniques) and therapeutic usage of *Tamra Bhasma*.

CONCLUSION

Rasakalpas containing *Tamra Bhasma* is used in treatment of various diseases since *Samhita Kala*. It is said to be very harmful if it's *Shodhana* and *Marana* is not done properly. More than 42 *Doshas* of *Tamra* were told by various texts of *Rasashastra* indicating how harmful *Tamra* is when used without proper *Shodhana* and *Marana*. In *Rasagranthas* especially in *Tamra Bhasma Amritikarana Samskara* is said to remove remaining *Doshas* of *Tamra Bhasma*. In *Rasagranthas* especially in *Tamra Bhasma Amritikarana Samskara* is said to remove remaining *Doshas* of *Tamra Bhasma*. This study can be used to prepare proper *Tamra Bhasma* by using classical method and to develop manufacturing procedure of *Tamra Bhasma*.

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Figure 3: *Samanya Shodhana* of *Tamra*

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Figure 4: *Vishesha Shodhana* of *Tamra*

Figure 5: *Marana* of *Tamra*

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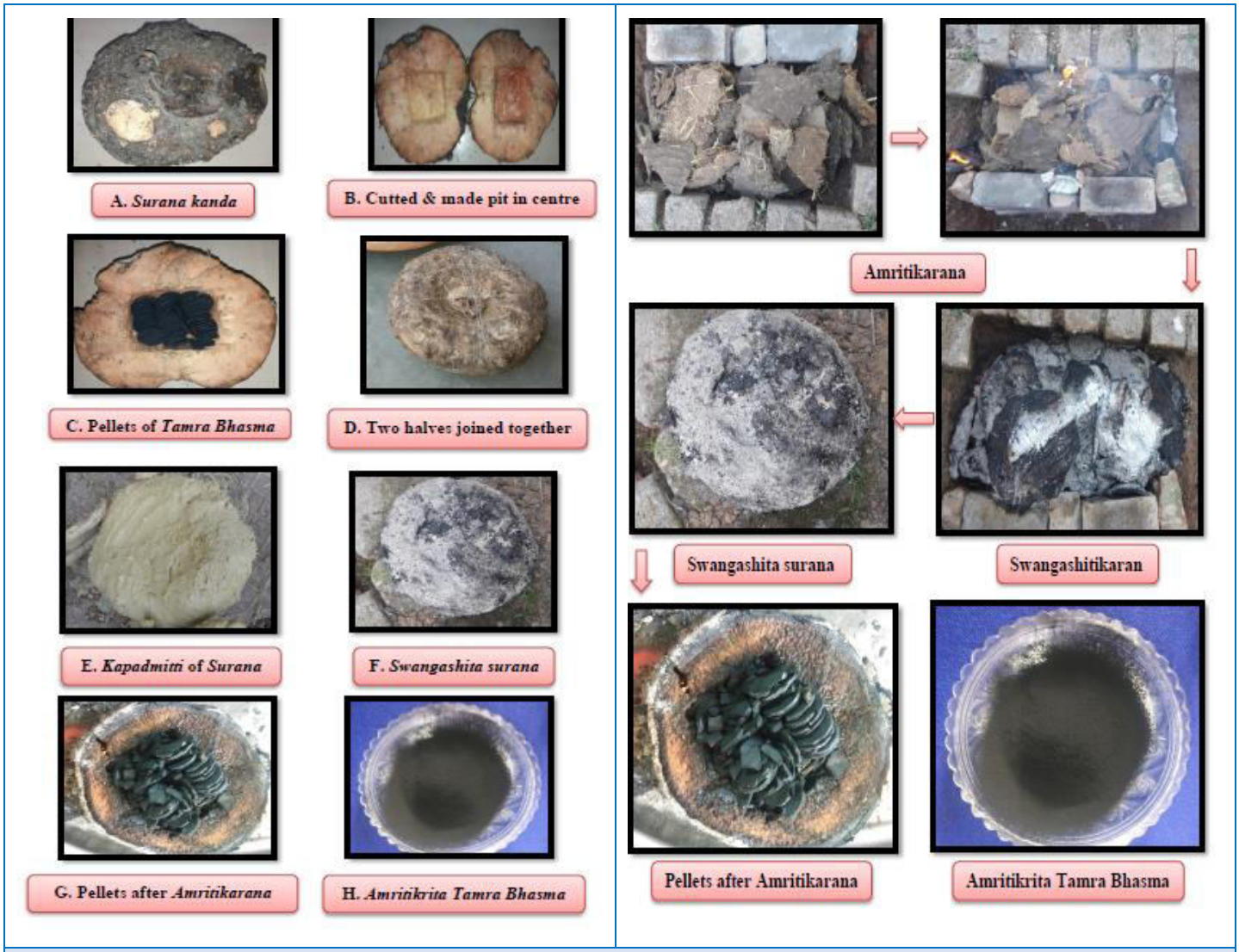

Figure 6: *Amritikarana* of *Tamra*

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