

A COMPREHENSIVE ANALYSIS ON MARAN METHODS OF PRECIOUS GEMSTONE: VAJRA

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ABSTRACT

In Rasashtra; Vajra (Hirak, diamond) is a precious gemstone classified under the Ratna Varga. To convert hirak into body absorbable form, various bhasma nirman methods were described in classical texts. Diamond being one of the hardest substance in the world (hardness of 10); to convert it into a Hirak Bhasma is a difficult task. Hirak bhasma is being used since ancient times on various terminal illnesses like Rajayakshma (T.B.). In current research advances, many works are being conducted on its antitumour activity and other properties. The objective of the study was to formulate inclusive data of Vajra Marana recorded in various Ayurvedic texts. This review reveals the Marana methods and maran dravyas compiled from various Rasa Granth also referred for review. Probable mode of action of most commonly used maran dravyas are also compiled. Total 9 Rasa granthas were reviewed. There are about 36 methods for Vajra marana used in these

classics. Among these, all methods are mainly divided into two basic principles behind that classification. Putan and other method is nischechan. Total 49 maran dravyas are used in bhasmikaran process are of either herbal, mineral or animal origin. Most common maran dravyas are Kulatta, Meshasringi, Shuddha gandhak, shuddha manasheel and shuddha hartal. Maran dravyas either have strong acidic composition (for herbal origin maran dravyas) or they have degenerative action on bonds of diamond (for mineral origin maran dravyas). This article will be useful for researcher working on hirak bhasma and will definitely save their time and additional efforts.

KEYWORDS: Hirak, Maran Dravyas, Bhasma.

INTRODUCTION

Vajra (diamond) has been included under Ratna Varga in the classical text of Rasa Shastra.^[4] (A Science dealing with the study of metals, with special importance to mercury, minerals, and their therapeutic applications) Vajra Bhasma is used in Dehavada (treatment of human beings) as well as Dhatuvada (transformation of lower metals like iron, tin etc into noble metals like gold, silver) in Rasa Shastra. A diamond is the hardest known naturally occurring element. A diamond is a very persistent metastable form of carbon.

In Rasashstra, vajra (diamond) is used for internal use after it's bhasmikaran. Vajra Bhasma is said to be Ayushpradam (improves lifespan), Doshatraya prashaman (alleviates all the three Doshas), Sakala aamayaghana (capable of eradication of all the diseases), Sutendrabandha krut (helpful in mercury binding), and Shad rasatmaka (possesses all the six tastes). It also possesses Vrushya (aphrodisiacs), Yogavahi and Rasayana properties. Vajra Bhasma is known for its high potential as an apoptogenic, analgesic, antimicrobial, alternative antioxidant, anti-inflammatory, antibacterial agent and immuno-modulator as per the new researches.^[1] The prime pharmaceutical processes for the preparation of any Bhasma are Shodhana (purifying process) and Marana (the process of making Bhasma). Many pharmaceutical companies are preparing and marketing Vajra Bhasma (diamond ash) for challenging disorders like T.B., cancer, tumors etc. Despite the wider applications of Vajra Bhasma in Ayurvedic practice, information on the detailed pharmaceutical aspect of the preparation is still lacking. Hence, the present study attempts to cover in-depth information on preparation methods of Vajra Bhasma mentioned in various rasagranthas. This is an attempt to make it easy for researchers to search regarding various vajra marana methods and maran dravyas. The classical texts that has been reviewed are rasaprakash sudhakar, rasahriday tantra, rasarnava, Bhavprakash samhita, Yog ratnakar and Rasatarangini. This article will be useful for researcher working on hirak bhasma and will definitely save their time and additional efforts.

AIM

To review various classical methods of vajra marana in different classical texts.

OBJECTIVES

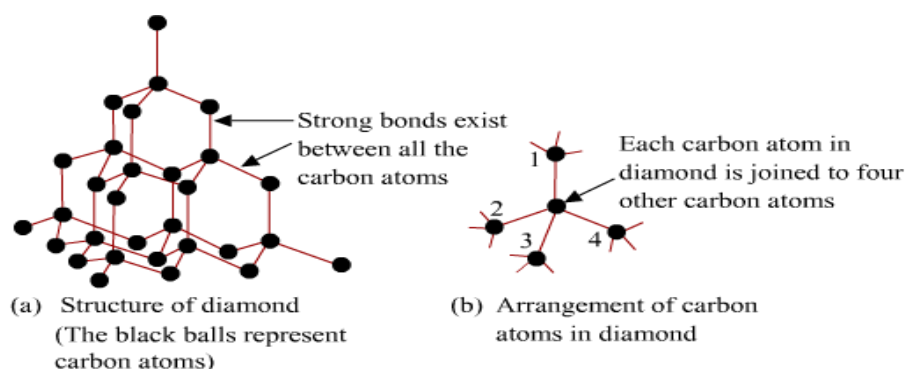
1. To review various methods of vajra marana in different classical texts.

- To make a collection of vajra marak dravya and their probable mode of action.

LITERATURE REVIEW

Vajra has been used in since ancient times as rejuvenating tonic and as ailment for several terminal illnesses. Even wearing the good quality(grahya) vajra is said to remove toxins from body and fortune giving. Vajra has been categorized in three types as streevajra, purush vajra and napunsak vajra.

Image 1



(https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.toppr.com%2Fask%2Fquestion%2Fwhat-is-diamond-of-what-substance-is-diamond-madeb-describe-the-structure-of-diamond%2F&psig=AOvVaw1UL2A0duH1BxmKoZ_hHwgE&ust=1703076375513000&source=images&cd=vfe&opi=89978449&ved=0CBIQjRxqFwoTCNi_l4zEm4MDFQAAAAAdAAAAABAX)

Grahyatva of Vajra

There are three types of vjra as per 'Jati' and 'Varna' given by Ayurved Prakash^[11] and Rasa Ratna Sammucha^[13] i.e., Brahmana - Shweta Varna, Shatreyaya - Rakta Varna, Vaishya - Pitta Varna and Shudra - Krishna Varna.

Further 'Vajra' is classified in three types according to Rasa Ratna Sammucha¹³ and Ayurved Prakash^[11] i.e., Nara - Uttam, Nari - Madhyam and Napunsak - Adham; Nara type can be useful to everyone, Nari type useful to female.

Agrahya Vajra

According to Rasa Tarangini^[14] the 'Vajra' which is round bodied without any angles and surfaces and is unclean, bluish in color, with dull radiance, broken, having rough outer body and the one with many lines it is considered to be agrahya.

Vajradosh

Grasa, Trasa, Bindu, Rekha and Jalagarbhata are the five doshas of Ratna according to Rasa Ratna Sammucchya.^[13]

Bindu, Kakapad, Yava, Mala and Rekha are the five doshas of Vajra (diamond) according to Ayurved Prakash.^[11]

Gatrakhand Grahan Nirdesh

Although the vajra seems costly, but use of the broken parts (*gatrakhand*) of *hirak* for formulation is indicated in Ayurved Prakash.^[11] This cuts the cost of the formulation.

Patibhasha

The operational definitions are mentioned in many maran methods like kwath, swarasa, nirvapa etc. These all are taken from sharangdhar samhita (*madhyamkhda*)^[5] for herbal formulations and from rasatarangini (*paribhasha prakarana*)^[14] for mineral formulations and rasashastriya concepts.

Vajra Shodhana

Diamond is hardest substance with hardness 10. So, to convert it in bhasma, shodhan should be done prior. This not only removes impurities but also promotes breakdown of vajra.^[12] This facilitates bhasmikan process.

According to Rasa Tarangini^[14], Vajra Bhasma prepared from impure Vajra causes Parhswa Pida, Rakta Dushti Janya Kushta, Tapa Vriddhh, Bhrama, Murccha and other complications. So as the need of shodhan.

Vajra Maran(Bhasmikaran)

Bhasmikan converts material from its zero-valent state to a higher oxidation state and thus eliminates the toxic nature of the material.^[8]

Diamond has the highest thermal conductivity, so heat is the only treatment that can be applied to break down its bonds. The coefficient of thermal expansion of diamond is extremely low, so much time is required for heating and dipping processes.^[8]

To prepare vajra for pharmaceutical use, maran process is done. Total 36 methods were collected from 9 rasagranthas.

The samitasa and rasagranthas that were reviewed are as follows.

Vajra Bhasma Properties In Texts

Table 1.

Sr No	Text Name	Properties
1.	Rasarnava ^[19]	-
2.	Rasaprakash Sudhakaar ^[16]	Ayuprada, Vrishyatam, Doshtaya unmulanam, Rasendra bandha krut, sudhasama, Apamrutyunashan ^[9]
3.	Rasaratnasammucchaya ^[13]	Amrutopam, Ayushprada, Vrishya, Doshtayaprasham, Sakalamayaghna, sutendra bandhakrut, Sadgunapradipghna, Mrityunjaya ^[6]
4.	Sharangdhar Samhita ^[5]	Aayu, pushti, bala virya, varna krut,sevitam sarva rogghnam ^[10]
5.	Bhavprakash Samhita ^[15]	Aayu, Pushti, Bala, virya, saukhya kar, Sevitam Sarva rogagghnam ^[11]
6.	Yogratnakar	Samirkaphapitta gadannihanti(eradicates diseases derived from all the three doshas), body becomes stable like vajra (diamond/weapon of lord Indra), Useful in diseases like shosh, kshaya(T.B.), Bhrama(Giddiness), Bhagandara(fistula), Anaemia(pandu), Udara(ascites), Swayathu(inflammation), Shandhya (Impotency) ^[12]
7.	Rasatarangini ^[14]	Paramhridya, Shadrasanvit, Yogvahi,Rasayan, Rajyakshma prashaman, Mehmedvinashan, Pndu, Shoth, udarhara, Vrishya, Netrya, Balya, Vividhamayaghna, Sudhopam ^[7]
8.	Ayurved Prakash ^[11]	Ayushpradam, Sutendra Bandhkrut, Vrishya, Mriyunjaya, Amrutopamam

Detailed Marana Procedure Review Text Wise

Rasarnava^[19]

There are total 13 methods mentioned in rasarnava. These are explained in shashta patal under abhrakadi samskar nirnaya. Unique feature of Rasarnav is that maran procedures are explained varna wise. Different methods are mentioned as per varna and jati of hirak. Many dravyas used for hirak maran in rasarnava are unidentified today like mahanadi shwet shunthi, kshirottar varuni etc. Use of many animal origin dravyas like Shashadant(Rabbit tooth), Striraja (Menstrual Blood of human female) etc are used for maran purpose.

Table 2.

Sr No	Procedure used for marana	Dravyas used	Detailed Procedure
1.	Bhavna Nirvap (Kapalik Yog)	1. Kulattha kwath 2. Kodrava kwath 3. Ashwamutra	Shuddha Hirak is triturated with kulattha, kodrava kwath(decoction) and ashwamutra (Horse urine). Then it is heated till red hot and the dipped in the same mixture. Procedure is repeated till we obtain bhasma.
2	Musha Dhmapam	1. Shuddha Makshik 2. Meshsringi 3. Shuddha Manashila 4. Shuddha Hartal 5. Shuddha Gandhak 6. Shuddha Tankana 7. Shuddha Vaikrant 8. Vajrikshir	The mentioned dravyas are taken in equal proportion. Shuddha hirak is added in it and is triturated. This paste is applied inside the musha (crucible). Bhasma is formed with the help of controlled agni.
3	Musha Dhmapan	1. Shuddha Gandhak 2. Shuddha Shilajatu 3. Bhramak mukh 4. Shashadanta 5. Amlavetas	The mentioned dravyas are taken in equal proportion. Shuddha hirak is added in it and is triturated. This paste is applied inside the Andha musha. Andhamusha is kept in koshti. Hirak bhasma is formed instantly with this method as per the text.
4	Musha Dhmapan	1. Shuddha Hartak 2. Shuddha Gandhak 3. Shuddha Kantlauha 4. Shuddha Suvarnamakshik(Tapya) 5. Shuddha Karpur 6. Shuddha Tankana 7. Chinchasthi 8. Meshsringi 9. Striraja(Menstrual Blood of woman)	The mentioned dravyas are taken in equal proportion. Shuddha hirak is added in it and is triturated. This paste is applied inside the Andha musha. Andhamusha is kept in koshti. Hirak bhasma is formed instantly with this method as per the text.
5	Musha Dhmapan	1. Sharapunkha Panchang(Kalka) 2. Striraja(as a liquid media)(Menstrual Blood of woman)	Shuddha hirak is triturated with the mentioned ingredients. This paste is applied inside the Andha musha. Andhamusha is kept in koshti. Hirak bhasma is formed.
6	Musha Dhmapan	1. Petarika Beej (Kalka) 2. Tandulodak (As a liquid media)	Shuddha hirak is triturated with the mentioned ingredients. This paste is applied inside the Andha musha. Andhamusha is kept in koshti. Hirak bhasma is formed.
7	Musha Dhmapan	1. Mahanadi shwet shunthi 2. Kshirottar Varuni 3. Shuddha Harital 4. Meshsringi 5. Vajravalli	Shuddha hirak is triturated with mahanadi shunthi for 1 day. Then shuddha hirak is grinded with kshirottar vruni to form the pallet. This pallet is covered with mixture of Shuddha harita, Meshsringi and vajravalli. It is then placed in Andhamusha and dhmapan is done to obtain hirak bhasma.

8	Putan	1. Karavir 2. Arkadugdha 3. Meshshringi 4. Shuddha Hingul 5. Udumbar	(Kshatriya Vajra Marana) The mentioned dravyas are taken in equal proportion. Shuddha hirak is added in it and is triturated. Chakrika(circular pallets) are formed with this mixture and are shade dried. They are placed in the Putayantra and put is given. (Gajaput)
9	Putan	1. Bala 2. Atibala 3. Shuddha Gandhak 4. Karkatasthi (Crab shell) 5. Kshirottat Varuni	(shudravajra Maran) The mentioned dravyas are taken in equal proportion. Shuddha hirak is added in it and is triturated. Chakrika(circular pallets) are formed with this mixture and are shade dried. They are placed in the Putayantra and put is given. (Gajaput)
10	Putan	1. Suran 2. Manasheela 3. Rason 4. Nyagrodh 5. Shuddha Shankh 6. Vajridugdha	(shudravajra Maran) The mentioned dravyas are taken in equal proportion. Shuddha hirak is added in it and is triturated. Chakrika (circular pallets) are formed with this mixture and are shade dried. They are placed in the Putayantra and put is given. (Gajaput)

RASAPRAKASH SUDHAKAR^[16]

There are 3 methods of vajra marana mentioned in this text. These are mentioned in 7th chapter of it They are as follows.

Table 3.

Sr No	Method used	Dravyas Used	Detailed Procedure
1.	Bhavan, putan, nirvapa	Matkun Rakta (Bedbug blood) Chuchundari Mansa Kulattha Kwath Manasheela (arsenic compound) Shuddha Parad(purified mercury)	4 bhavanas should be given by bedbug blood to the shodhit hiraka. Later it should be placed inside chuchundari mamsa followed by 30 varahaputas.Later take the hirak and heat it till become red hot and is dipped in the kulattha kwath(decoction). The procedure should be repeated 100 times. Later the hiak is taken and is grinded with manasheela. It is then kept in musha and heat is given by 8 vanyotpala(cowdung). After repeating the process 100 times, it is then triturated with shuddha parada(mercury). And Hirak bhasma is obtained.
2	Swedan, Nirvap	Kasamarda swaras Matkun Rakta Gomotra	Iron vessel is first covered with bedbug blood. Kasamarda swaras is taken in that vessel and swdan of shodhit hiraka is done for 7 days.

RASARATNASAMUCHAYA^[13]

Total five methods of vajra mara are explained in rasaratna sammucchaya. Most commonly puta method is used for bhasmikan. Methods are as follows.

Table 4.

Sr No	Method used	Dravya Used	Detailed Procedure
1	Bhavna Putan Musha Dhaman Nirvapa	1. Matkun Rakta 2. Sugandhimusheeka (Mole) 3. Kulattha Kwath	Initially four subsequent bhavanas of matkun rakta should be given to shuddha hiraka. Then it should be covered with flesh of sugandhimushika and varah put should be given. After repeating 30 varaha putas hirak should be placed in musha and musha should be placed in koshtika for dhmapana. Later hirak should be heated till red hot and dipped in kulattha kwath. Repeating the process 100 times one can get hirak bhasma.
2	Musha Dhaman Nirvapa	1. Matkun Rakta 2. Kasamarda Swaras	Shuddha hirak khanda should be covered with matkun rakta and should be placed to sun dry. This step should be repeated 7 times. After that hirak should be placed in musha and dhaman should be done. Kasamarda swaras should be placed in iron vessel. Hirak should be heated till red hot and dipped in above decoction. Procedure should be repeated 7 times. This procedure is given by Bramha Jyoti Munindra
3	Musha Dhmapana Putana	1. Shuddha Manasheel 2. Kulattha Kwath 3. Lakuch Swarasa 4. Shuddha Parada	Initially shuddha hiraka should be grinded with shuddha manasheel followed by bhavanas of kulattha kwath and lakuch swarasa. The paste is then applied inside musha. Another musha is placed on the musha at base and their joint is properly packed with 7 rounds of kapadmitti. Varahaputa should be given. The procedure should be repeated 8 times. Then the aquired hirak is heated till red hot and dipped in shuddha parada. The procedure should be repeated 100 times to get bhasma. By this process we get varitar(one which floats on water) hirak bhasma.
4	Putan	1. Nil jyoti Lata Kanda	Shuddha hirak should be triturated with Niljyoti Lata Kanda swarasa and then should be dried under sun. Later only in single gajaputa one can obtain hirak bhasma.
5	Putan	1. Madanphala 2. Bhunaga(earthworm)	Bhunagas should be triturated with madanphala swarasa. This paste is applied on shuddha hirak again and again and is allowed to dry. Then Gajaputa should be given. Repeating this process 20 times we can obtain hirak bhasma. This should be used in rasayan Prayoga(Rejuvenating therapy)

AYURVED PRAKASH^[11]

There are five methods of hiraka marana mentioned in Ayurved Praasha panchamodhyaya.

The same methods seems to be repeated in yogratnakar.

Table 5.

Sr No	Method Used	Dravya Used	Detailed Procedure
1.	Musha Dhmapan	1.Karpasa mula (3 years old Plant should be taken) OR 2..Nagvallipatra (3 years old plant should be taken)	The karapasa mula or nagvallipatra is taken in khalva yantra. It is grind to form a smooth pallet. Shuddha hirak is covered with the pallet and is placed in musha for dhmapan.
2.	Musha Dhmapan	Meshshringi Bhujangasthi (skeleton of snake) Kurmaprushta (Back of Tortoise) Shashadanta (Teeth of Rabbit) Vajrikshir	Meshshringi, Bhujangasthi, kurmaprushta, amlavetas, shashadant(rabbit teeth) should be taken in equal proportion and triturated with vajrikshiri. Then a pallet is formed from the above mixture and is put in musha. Musha is kept in koshti. When temperature is normalized(swangsheet), hirak bhasma is collected from musha.
3	Nirvapa	1,Manduk Mutra	A frog is placed in kansya patra. When he discharges urine due to fear, he is taken out of the vessel. Shuddha hirak is heated till red hot and then is dipped in the manduk mutra(frog;s urine) collected prior. After repeating above procedure several times vjra bhasma can be obtained
4	Nishechan	Khara mutra Matkun Rakta Harital Ashwamutra	Shuddha hirak is heated till become red hot and then dipped in khara mutra(urine of donkey). This procedure is repeated 21 times. Then trituration of matkun rakta with hartal taken in equal quantity is done to form a pallet. Nirvapit hirak is placed in the above pallet and is heated and them dipped in ashwa mutra(Horse urine). This process is repeated 21 times to get shankhasheetanshusundar bhasma(White like cochshell and moon).
5	Nirvapa	Hingu Saindhav Kulattha Kwath	Decoction should be prepared from kulathha and saindhav and hingu should be added as prakshep. THEN shuddha hirak should be heated till red hot and then should be dipped in the decoction. This procedure should be repeated 21 times till we get hirak bhasma.

SHARANGDHAR SAMHITA^[5]

Only one method of vajra marana is mentioned in Sharangdhar samhita.

Table 6.

SrNo	Method used	Dravyas Used	Dravyas Used
1.	Nirvapan	1. Hingu 2. Saindhav 3. Kulattha Kwath	Decoction should be prepared from kulathha and saindhav and hingu should be added as prakshep. Then shuddha hirak should be heated till red hot and then should be dipped in the decoction. This procedure should be repeated 21 times till we get hirak bhasma.

BHAVPRAKASH SAMHITA^[15]

There are 2 methods of vajra maran mention in bhavprakash samhita under Paribhashadi Prakaran Dhatavadishodhanmaran vidhi prakaran(244-247)

Table 7.

SrNo	Method used	Dravyas Used	Dravyas Used
1.	Nirvapa	Hingu Saindhav Kulattha Kwath	Decoction should be prepared from kulathha and saindhav and hingu should be added as prakshep. Then shuddha hirak should be heated till red hot and then should be dipped in the decoction. This procedure should be repeated 21 times till we get hirak bhasma.
2.	Bhavan and Dhmapan	Meshshringi Bhujangasthi (skeleton of snake) Kurmaprushta (Back of Tortoise) Shashadanta (Teeth of Rabbit) Vajrikshir	Meshshringi, Bhujangasthi, kurmaprushta, amlavetas, shashadant(rabbit teeth) should be taken in equal proportion and triturated with vajrikshiri. Then a pallet is formed from the above mixture and is put in musha. Musha is kept in koshti. When temperature is normalized(swangsheet), hirak bhasma is collected from musha.

YOGRATNAKAR(23)

In Yogaratanakara, there are 4 methods mentioned in purvardha in sheshratna shodhanmaran prakaran of Yogaratanakar.

Table 8.

Sr No	Method Used	Dravya Used	Detailed Marana Procedure
1.	Bhavna and putan	1. Karpasa mula (3 years old plant should be taken) OR 1.Nagvallipatra (3 years old plant should be taken)	The karapasa mula or nagvallipatra is taken in khalva yantra. It is grind to form a smooth pallet. Shuddha hirak is covered with the pallet and is placed in musha for dhmapan.
2.	Nirvap and bhavana	1. Khara mutra 2. Matkun Rakta 3. Harital 4. Ashwamutra	Shuddha hirak is heated till become red hot and then dipped in khara mutra(urine of donkey). This procedure is repeated 21 times. Then trituration of matkun rakta with hartal taken in equal quantity is done to form a pallet. Nirvapit hirak is placed in the above pallet and is heated and then dipped in ashwa mutra(Horse urine). This process is repeated 21 times to get shankhasheetanshusundar bhasma(White like cochshell and moon).
3.	Nirvapa	Hingu Saindhav Kulattha Kwath	Decoction should be prepared from kulathha and saindhav and hingu should be added as prakshep. THEN shuddha hirak should be heated till red hot and then should be dipped in the decoction. This procedure should be repeated 21 times till we get hirak bhasma.
4.	Nirvapa	1,Manduk Mutra	A frog is placed in kansya patra. When he discharges urine due to fear, he is taken out of the vessel. Shuddha hirak is heated till red hot and then is dipped in the manduk mutra(frog;s urine) collected prior. After repeating above procedure several times vjra bhasma can be obtained.

RASATARANGINI^[14]

In rasatarangini, in every method put prakriya is followed. This is latest rasagrantha focusing on dehavada so the methods given by rasatarangini might be more efficient as a rasayana.

Table 9.

Sr No	Method Used	Dravya Used	Detailed Procedure
1.	Putan	1. Shuddha Hartal 2. Shuddha Gandhak 3. Shuddha Hingul 4. Swarnamakshik bhasma 5. Badari Swaras 6. Pipal twak	Shuddha hirak, Shuddha Hartal, Shuddha Gandhak, Shuddha Hingul and Swarnamakshik Bhasm are taken in equal quantity and triturated with badari swaras and pipal twak swaras 7 times. Later chakrika are made from the paste and shade dried. Gajaputa is given. After first puta swarnamakshik bhasma should not be added. Same procedure should be repeated till bhasma is obtained.
2.	Putan	1. Rasasindoor	Shuddha hirak, Shuddha manasheela, Shuddha

		2. Shuddha Manasheela 3. Shuddha Gandhak	Gandhak and rasasindoor and are taken in equal quantity and triturated. Gajaputa is given. After first puta Rasasindoor should not be added. Same procedure should be repeated 14 times.
3.	Putan	1. Shuddha Hartal 2. Shuddha manasheela 3. Kapras mool	Shuddha hirak, Shuddha Hartal and Shuddha manasheel are taken in equal quantity and triturated for three hours under direct heat of sun with 3 year old karpas moola swaras. Mahaputa puta is given. Same procedure should be repeated 14 times.

MATERIALS AND METHOD

Since ages we find the references of ‘gemstones’ in Indian history. References of ‘Diamond’ are found in ‘Bruhat Samhita’. From samhita period therapeutic use of Diamond is mentioned. Later with development of Rasashastra, the shodan, marana and compound formulations of Diamond were introduced. For compilation of these maran processes detailed literature review was conducted.^[6]

Various Ayurvedic Samhitas with their commentaries by different authors, Rasa Granthas, web search, various texts were reviewed for the maran methods of hirak. E- samhitas were also reviewed. Information collected on knowledge of Vajra Marana from classical texts through the index of the same by searching word Hiraka Marana, VajraMarana, ratna marana etc. Detailed literature search was done. Total 9 classical texts were reviewed.

OBSERVATIONS

History of formation of Vajra is described only in Ayurved Prakash Rasa Grantha. Vajra is very important Ratna and Shodan and Marana is very important before consumption. Although Vajra is used in ornaments ; its various formulations are very useful to cure diseases. Vajra Bhasma when consumed in proper dose act as Rasayan and increases Immunity. Marana methods describes in various classical text are compiled in this study. Total 9 texts are reviewed. Total 36 methods are compiled.

Vajra maran methods mentioned in the reviewed rasagranthas as observed as follows.

Table 10.

Sr No	(Estimated Year)	Text Name	No of Vajra Marana Methods mentioned
1.	10-11 th century	Rasahridaya Tantra	0
2.	12 th century	Rasarnava	13
3.	13 th century	Rasaprakash Sudhakaar	3
4.	13 th to 14 th century	Rasaratnasammucchaya	5
5.	16 th century	Sharangdhar Samhita	1
6.	16 th century	Bhavprakash Samhita	2
7.	17 th century	Ayurved Prakash	5
8.	18 th century	Yogratnakar	4
9.	20 st century	Rasatarangini	3
		TOTAL	36

The Marana drvayas used in hirak maran can enlisted as follows (the in the frequency columns(Fq) the number of times marana dravya is repeated is mentioned. Scientific names of maran dravyas² are taken from Dr Nadkarni's (2) Indian materia medica).

Table 11.

Name of Dravya	Fq.	Name of Dravya	Fq	Name of Dravya	Fq
1.Kulattha (Macrotyloma uniflorum)	7	11.Saindhava (Rock Salt)	2	21.Makshik (Pyrite)	3
2.Matkun Rakta (Bedbug Blood)	4	12. Mamsa varga- Chucchundari Mansa Bandicota indica), Sugandhi Mushika Mamsa (Mole)	2	22. Meshsringi (Gymnema sylvestre)	6
3.Vajridugdha	4	13.Rason (Allium sativum)	1	23.Sheela jatu (Black Bitumen)	2
4.Shudda Haratal (Arsenic compound)	5	14.Suran (Amorphophallus companulatus)	1	24.Gandhak (Sulphur)	7
5.Nilajyoti Kanda	2	15.Nyagrodh (Ficus benghalensis)	1	25.Sharapunkha (Tephrosia purpurea)	1
6.Shuddha Manasheela (Arsenic Compound)	8	16.Shankha (conch shell)	1	26.Nagvalli (beetal)	1
7.Shuddha Parada (Mercury)	2	17.Tankana (Borax)	1	27.Kaprpas moola (Root of Gossypium herbaceum)	2
8.Mutra varga- Haya mutra (horse urine), Kharamutra (donkey urine), Gomutra (cow's urine, Manduk Mutra (Frog urine)	4	18.Shashadanta (Rabbit Tooth)	2	28.Shuddha Hingula (Cinnabar)	1
9.Kasamarda (Cassia occidentalis Linn) swarasa	2	19.Stree raja (Menstrual Blood of Female)	2	29.Rasasindoor (HgS)	1
10.Hingu (Ferula asafoetida)	2	20.KantaLauha (Iron)	1	30. Madanphala (Randia Spinosa)	1

Name Of Dravya	Fq	Name Of Dravya	Fq
31.Bhunag (Earthworm)	1	41.Bramak mukh	2
32.Bhujangasthi (Snake)	1	42.Karpur (Camphor)	1
33.Kurmaprushta (Shell of Turtle)	1	43.Chincha (Tamarindus indica Linn.)	1
34.Amlavetas (Solena amplexicaulis (Lam.))	2	44.Kshirottar Varuni	2
35. Karkatasthi (Skeleton of Crab)	1	45.Vajravalli (Cissus Quadrangularis)	1
36.Badari (Ziziphus mauritiana Lam)	1	46.Baladwaya (Abutilon Indicum (Linn.)and Sida cordifolia)	1
37.Pipal (Ficus religiosa)	1	47.Karaveer (Nerium Indicum)	1
38.Lakuch (Artocarpus lacucha)	1	48.Arkadugdha (latex of Calotropis gigantea)	1
39.Kodrava (Paspalum scrobiculatum L)	1	49.Udumbar (Ficus racemosa)	1
40. Vaikrant (Tourmaline)	1		

Most commonly used methods for bhasmikan are putan, nirvapan and mushadmapana. Temperature used for hirak marana is usually of gajaputa(600-900 °C) or mahaput(1000 1300°C). And putas^[9] are repeated many times. As hirak burns at 600°C⁷ so nishechana method is also described.

It can be observed that most commonly used maran dravyas are Kulattha, Manasheela, Gandhak, Matkun Rakta and Meshsringi.

As per Dr Panchware et al,^[3] Chemical composition of kulattha is as follows.

Anthocyanins- Cyanidin, delphinidin, malvidin, pteunidin.

Flavonoids - Diadzein, genistein, kaampferol, myricetin, quercetin.

Phenolic acids(benzoic acid derivatives)- Gallic acid, protocatechuic acid, phydroxybenzoic acid, syringic acid, vanillic acid.

Enzyme source- Aamylase a and b glucosidase b-Nacetylglucosaminidase, urease.^[3]

As per the chemical composition, Kulattha may help to break down of strong bonds between carbon in hirak.

Gandhak (Sulphur) is also most commonly used for hirak marana. As per Yuri N. Palyanov et al,^[22] presence of sulphur inhibits crystallization of diamond. It has been established that the sulfide component plays an inhibitory role in diamond crystallization processes. As the concentration of the sulfur additive (XS) in the system increases from 0 to 20 wt%, the degree of graphite-to-diamond transformation decreases from 100% to zero and the solubility of

carbon in the melt decreases from 6.6 to 0.4 wt%. Addition of sulfur to the growth system leads to the appearance of metastable graphite and its amount increases with increasing sulfur content.^[20]

Manasheela and hartal both are arsenic compounds, As per Sun et al,(18)As doping makes the Young's module of diamond decrease and the elastic constants of adjacent site configuration present metastable state. Finally, one arsenic particle adsorption on diamond (001) surface has also been studied. It is identified that Bridge site is the most suitable adsorption site for arsenic doping during diamond growth process.^[17]

CONCLUSION

Hirak being the hardest substance, need to under go various rasashastriya processes to convert upto bhasma form. Total 9 rasagranthas were reviewed for the marana methods. Most commonly used methods for bhasmikaran are putan, nirvapan and mushadmapana. There are total 49 dravyas used for maran purpose. Various plant origin mineral origin and animal origin drugs are used for maran purposes. Most commonly used maran dravyas are Kulattha, Meshsringi, shuddha gandhak, shuddha manasheela and shuddha hartal. Maran dravyas either have strong acidic composition (for herbal origin maran dravyas) or they have degenerative action on bonds of diamond (for mineral origin maran dravyas).

LIMITATIONS

There are about 107 methods of hirak marana mentioned in various rasashastriya texts. But all of these methods are not compiled here. Out of many rasagranthas only 9 rasagrantha and samhitas were reviewed. The mode of action of hirak maran dravya is probable and based on various research papers. But for exact mode of action further studies need to be conducted.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

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