

Bhanga (Cannabis sativa L.) as an activity potentiator in Ayurvedic classics and Indian alchemy (Rasashastra): A critical review

Review Article

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Abstract

Bhavana (impregnation) and *Swedana* (boiling) are the processes used in Ayurvedic pharmacy for preparation of formulations containing the drugs of metallic, mineral and poisonous origin to make them safe and potent for internal administration. Drugs of herbal origins are primarily used for the *Bhavana* process. *Bhanga* (*Cannabis sativa* Linn.) a drug with great medicinal potency has been highlighted for its *Deepana* (digestive stimulant), *Pachana* (digestive), *Ruchya* (Taste promoter), *Madakari* (intoxicant), *Vyavayi* (short acting), *Grahi* (withholds secretions), *Medhya* (memory booster), *Rasayana* (adapto-immuno-neuro-endocrino-modulator) activities were used as a processing media in many formulations. In 19th century, it is included in narcotic group of plants and its use, as a drug, has been restricted. In 21st century again, the drug is gaining attraction from scientific communities due to its wide pharmacological properties. However, there is no collective information available at a glance regarding the use of *Bhanga* in various processing techniques of classical formulations. Hence, it is the need of the time to present the comprehensive information on cannabis, as quoted in classical texts with probable research co-relation, so as to bring the drug again in to limelight. The present review aims to compile all the information about the use of cannabis as an activity potentiator so that it can be further practically utilized in pharmaceuticals and clinics with legal permissions. A thorough review, from available 41 *Rasagranthas* (text related to Indian alchemy) and 26 classical texts was carried out to compile the information about formulations where *Bhanga* is used as process media. The review shows that; *Bhanga* has been used, as a pharmaceutical processing agent, in 157 formulations being indicated in 40 different disease conditions. Among them, in 154 formulations, it is used as *Bhavana* media and in 3 formulations as a *Swedana* media. The present observation could help the future researchers to explore the drug for therapeutic utilities.

Keywords: *Bhanga*; *Bhavana*; *Cannabis sativa* Linn.; herbo-mineral drugs; potency; levigation; trituration

Introduction

Ayurvedic pharmaceuticals have described the process of preparations of various drugs of metals, minerals, animal products and poisonous herbal origin with their indications and contraindications. These drugs are rarely administered alone in their crude form and are often combined with a number of substances through various pharmaceutical processes, which transforms them into a convenient dosage form that can be easily administered without hazardous effects. Classics have composed all these process under a heading “*Samskara*” (transformation) by describing it as “*Samskaro hi Gunantaradhano uchyate*” i.e. transformation process brings about change in inherent properties of drugs. (1)*Bhavana* (impregnation), *Swedana* (boiling) are some amongst the *Samskara* procedures of metallic formulations.

Bhavana is defined as a pharmaceutical process in which the material is completely submerged with the sufficient liquid media viz. plant extractives *Swarasa* (expressed juice), *Kwatha* (decoction) etc. or animal products (urine, milk etc.) are triturated till complete absorption of liquid into the powder. (2) Thus, trituration plays a pivotal role in the alteration of *Gunas* (properties) of drugs and make it compatible to achieve desired therapeutic effects. With minute observations over classical texts it infers that, plants categorized under semi-poisonous group of drugs have been used as an agent in the process like *Shodhana* (purification), *Bhavana* (impregnation), *Swedana* (boiling), *Marana* (calcinations), *Mardana* (grinding), *Manthana* (churning) etc. to reduce metals to ash forms.

Bhanga (*Cannabis sativa* L.) is one of the important Indian medicinal plants described in various classical texts of Ayurveda under *Upavisha* (semi-poisonous) group of drugs possess *Aashu* (quick act) property. If used wisely with proper purificatory methods it show effects like *Amruta* (nectar). Authors of various classical texts and *Rasagranthas* (texts related to Ayurvedic pharmacy) have different view about the use of *Bhanga* as a *Bhavana* (impregnation) media, its extractive form, quantity, number and duration of trituration. The plant has been highlighted for its *Deepana* (digestive stimulant), *Pachana* (digestive),

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Ruchya (taste promoter), *Madakari* (intoxicant), *Vyavayi* (short acting), *Grahi* (withholds secretions), *Medhya* (memory booster), *Rasayana* (adaptogen) activities. If handled wisely, it produces wide therapeutic actions. Improper use of *Bhanga* produces additive and psychotropic effects. (3) Thus, it has been included under narcotic group of drugs and its use without legal permission is prohibited. In 21st century again the drug is gaining attraction from scientific communities due to its wide pharmacological properties. Hence, it is the need of the time to present this comprehensive information on cannabis so as to bring the drug again in limelight. The present review compiles all the information about the use of cannabis as a *Bhavana* drug to increase the potency of formulations so that it can be further practically utilized in pharmaceuticals and clinics.

Materials and methods

Information of herbo-mineral formulations where *Bhanga* is being used as a *Bhavana* agent are extracted from available 41 *Rasagranthas* (text related to Indian alchemy) and 26 *Chikitsagrantha* (text related to treatment protocols) and other Ayurvedic treatises. Seventeen *Rasagranthas* and seven *Chikitsagranthas* have mentioned *Bhanga* as a *Bhavana* media in different formulations. The formulations levigated with *Bhanga* are found in *Rasagrantha's* namely *Rasaprakashasudhakara* (4), *Rasaratna-samucchaya* (5), *Rasachintamani* (6), *Rasendrachintamani* (7), *Rasendrasarasamgraha* (8), *Rasakamdhenu* (9), *Bhaishajyaratnavali* (10), *Bruhatrasarajasundara* (11), *Rasarajamadhodadhi* (12), *Rasayogasagara* (13), *Siddhabhaishajya-Manimala* (14), *Rasatarangini* (15), *Rasendrasambhava* (16), *Bharata Bhaishjya Ratnakara* (17), *Rasajalanidhi* (18), *Rasapaddhati* (19), *Rasamanjari* (20) and in classical texts like *Yogaratanakara* (21), *Bhavaprakasha* (22), *Vaidyakjeevana* (23), *Vaidyamanorama* (24), *Vaidyachintamani* (25), *Vaidyarahasya* (26), *Bruhatanighanturatnakara* (27). The formulations in which *Bhanga* is used for levigation, trituration and boiling procedures are included and rest formulations have been excluded from this review.

A search was undertaken in Google scholar, MEDSCAPE, BMC, Science Direct, MEDLINE (www.pubmed.com)/pubmed database, SCOPED

and other relevant databases, using keywords like *Bhavana*, *Swedana*, impregnation, levigation, wet trituration, wet grinding, *Samskara*, Liquid media for *Bhavana*, Ayurvedic pharmaceuticals, *Rasa Shastra* and *Bhaishajya Kalpana* with their corresponding mesh terms in combination like OR, AND. Published articles relevant to topic were screened. All the identified articles using the online search were screened by reading the 'Title' and 'Abstract'. The articles and searched Ayurvedic information not satisfying the search criteria were excluded from the final analysis. The information selected for inclusion at this stage was further screened for suitability by thorough reading. This search was undertaken in March-April 2016.

Observations and result

The text *Rasendramangala* of 7-8th century introduced *Bhanga* in *Rasashastra* (Indian alchemy) as one of the drug used for *Deepana Samskara* (process done for increasing digestive power of mercury) of mercury (*Parada*). (28) There are many drugs like indicated for *Deepana Samskara*, the effect of single drug *Bhanga* amongst them is difficult to analyze. Recently, *Cannabis* have received renewed interest in recent years due to their diverse pharmacologic activities such as appetizer, digestive, antiemetic, antispasmodic, analgesic, anti-inflammatory, anticonvulsant, hypnotic, anti-psychotic & cataleptic, memory enhancer, anti-asthmatic, cardio-protective, anesthetic, antiepileptic, anti-fertility, cell growth inhibition and anticancer etc. thus giving lead to use of this drug in various clinical syndromes. The drug has showed promising outcomes in conditions like Irritable bowel syndrome (IBS), fever, insomnia, migraine, cancer, tumor regression and cancer therapies induced side effects etc. [29]

Impregnation and boiling are important pharmaceutical procedures which bring changes in chemical form of compound. *Bhavana* process can be carried out by adopting methods like levigation and soaking. The media used in impregnation and boiling has its own physical, chemical and therapeutic properties which brings changes in qualities the principle ingredients. Total 154 formulations consisting Cannabis as trituration media and 3 formulations as *Swedana Dravya* (boiling media) were found. Formulations levigated with *Bhanga* are presented in tabular form.

Table 1: Formulations containing *Bhanga* as a *Bhavana* (impregnation) media

Sr. No	Formulations (Yoga)	Main Indications (Adhikara)	Type of extract (Kashaya Kalpana) or Anuapana (vehicle)	No/ duration of Bhavana	Dosage form (Kalpana)	Dose (Matra)	Action of Drug (Karmukatawa)	Reference	Page No.
1	<i>Aamavatadi vajra Rasa</i>	<i>Amavata</i> (Rheumatism)	<i>Swarasa</i>	7	<i>Rasa</i>	½ <i>Masha</i>		13	140

Sr. No	Formulations (Yoga)	Main Indications (Adhikara)	Type of extract (Kashaya Kalpana) or Anuapana (vehicle)	No/ duration of Bhavana	Dosage form (Kalpana)	Dose (Matra)	Action of Drug (Karmuk atwa)	Reference	Page No.
2	<i>Aamkutha Rasa</i>	<i>Atisara</i> (Diarhoea), <i>Grahani</i> (Malabsorption syndrome)	<i>Swarasa</i>	3 days	<i>Rasa</i>	3 <i>Ratti</i>		13	137
3	<i>Abhinyasa hara Rasa</i>	<i>Kaphaja Jwara</i> (fever due to <i>Kapha dosha</i>), <i>Rasayana</i> (adapto-immuno-neuroendocrino-modulator), <i>Vajeekarana</i> (Aphrodisiac)	-		<i>Rasa</i>	1 <i>Masha</i>		13	280
4	<i>Abhra Rasayana</i>	<i>Rasayana</i>	-		<i>Rasa</i>	1 <i>Kalaya</i>		13	64
5	<i>Abhra vatika</i>	<i>Jwaratisara</i> (Diarrhoea with fever), <i>Grahani</i>	<i>Swarasa</i>		<i>Vatika</i>	1 <i>Kalaya</i>	<i>Balya, Vajeekarana</i>	13	70
6	<i>Abhraka Rasayana</i>	<i>Rasayana</i>	<i>Bhavana</i>		<i>Vati</i>			17	318
7	<i>Abhra Vatika I</i>	<i>Rasayana</i>	-		<i>Gutika</i>		<i>Balya, Jwaraghna</i>	17	72, 35
8	<i>Agastisutraja rasa</i>	<i>Grahani</i>	-		<i>Rasa</i>			18	293
9	<i>Agnimukha Rasa</i>	<i>Vatika Shoola</i> (pain due to <i>Vata dosha</i>)	<i>Swarasa</i>	3	<i>Rasa</i>	a)1 <i>Chanaka: Vatik Shoola</i> b)1 <i>Masha: Sadharana Shoola</i>		5, 16	349
10	<i>Agnimukha Rasa II</i>	<i>Agnimandya</i> (digestive impairment), <i>Shoola</i> (pain), <i>Rasayana</i>	<i>Kwatha</i>	1	<i>Rasa</i>	3 <i>Ratti, 1 Tola</i>		9, 13, 27	39
11	<i>Agnimukha Rasa</i>	<i>Shoola</i>	-		<i>Rasa</i>	1 <i>Chanaka</i>		17	367
12	<i>Agnikumara Rasa II</i>	<i>Grahani</i>	-	1	<i>Rasa</i>	4 <i>Masha</i>		13	39, 9
13	<i>Ajeernari Rasa</i>	<i>Ajeerna</i> (indigestion), <i>Rasayana</i>	-		<i>Rasa</i>		<i>Deepana, Pachana</i>	11	376
14	<i>Ananda Rasa</i>	<i>Rasa</i>	-	1day	<i>Rasa</i>	1 <i>Ratti</i>	<i>Grahi, Deepana, Shukrala</i>		24
15	<i>Anandabhairava Rasa (Dwitiya)</i>		-		<i>Rasa</i>	½ <i>Tola</i>		13	604
16	<i>Anandabhairava Rasa 12</i>		-		<i>Rasa</i>			13	133

Sr. No	Formulations (Yoga)	Main Indications (Adhikara)	Type of extract (Kashaya Kalpana) or Anuapana (vehicle)	No/ duration of Bhanava	Dosage form (Kalpana)	Dose (Matra)	Action of Drug (Karmukatawa)	Reference	Page No.
17	Anandabhairavi Vatika (12)	Rasayana	Swarasa	2 days	Vati			13	134
18	Anandabhairavi Vati	Jwara (fever)	Swarasa		Vati	1 Ratti, 1 Chanaka	Jwaraghna, Bhedana	8, 17	256
19	Anandabhairavi Vatika 11	Rasayana	-	1 day	Vati			13	134
20	Anangamekhala Gutika		Swarasa		Gutika		Kamvardhana, Shukrala	17	32
21	Aparswacchanda nayaka Rasa	Jwara	Kwatha		Rasa	1 Masha		9	68
22	Atisaradalano Rasa II	Atisara	Swarasa	7	Rasa	1 Ratti		13	54
23	Atisarebhsinha Rasa II	Atisara	-	-	Rasa	1-2 Ratti	Grahi, Stambhana	11, 17	56
24	Atisarhara Rasa I	Atisara	Swedana, Swarasa, Churna		Rasa	6 Ratti		13	55
25	Atisarhara Rasa III	Atisara, Grahani	-	3yama	Rasa			13	55
26	Bhairava rasa	Kaphaja Jwara	-	1 day		3 Ratti		11	275
27	Bruhat Jwarankush Rasa	Vishamajwara (intermittent fever)	-	2 days				11	318
28	Bruhat Rasendra Gutika	Kasa (cough)	-			1 Kalaya	Rasayana, Balya, Vrushya	11	415
29	Bruhatchintamani Rasa (ii)	Sarva Jwara (All types of fever)	-	7	Rasa			16	264
30	Bruhatchintamani Rasa	Jwara	-	7	Rasa	2 Ratti		17	793
31	Bruhatrasendra Gutika	Kasa	Swarasa	1 Tola	Gutika	1 Kalaya		10	450
32	Bhuvaneshwara Rasa	Jwara			Rasa	1 Tola		18	77
33	Chintamani Rasa (Bruhat)	Jwara		7	Rasa	1 Ratti	Jwaraghna, Kasaghna	10	165
34	Dakshayani Rasa	Atisara			Rasa	1 Ratti		18	213
35	Dhatujwarankush rasa	Sannipata Jwara (high grade fever due to vitiation of all doshas)		3 days	Rasa	1 Masha		12	75
36	Dugdahavati (3)	Grahani			Vati			10	282
37	Dwijupti Rasa	Agnimandya	Swarasa	¼ Tola	Rasa	7 Sarshapa	Deepana, Pachana	18	246
38	Eksuteshwara Rasa	Sannipata (disease due to vitiation of all doshas)	Swarasa	3	Rasa	1 Ratti		13	191

Sr. No	Formulations (Yoga)	Main Indications (Adhikara)	Type of extract (Kashaya Kalpana) or Anuapana (vehicle)	No/ duration of Bhavana	Dosage form (Kalpana)	Dose (Matra)	Action of Drug (Karmukatawa)	Reference	Page No.
39	Gandhaka Parpati	Rasayana			Parpati	1 Ratti		13	362
40	Gangadhara Rasa (2) Kutaja leha	Atisara			Leha	½ Ratti		13	353
41	Grahani Vajrakapata Rasa	Sangrahani (malabsorption syndrome)	Swarasa	7	Rasa			6, 25	201
42	Grahani-gajendra Rasa	Jwara-Atisara	Ing parts 1/20		Rasa	2 Masha		8	338
43	Grahani-gajendra Rasa	Jwara-Atisara			Rasa	12 Ratti		18	241
44	Grahani-gajendra Vatika	Sangrahani				1-2 Ratti	Deepana, Pachana, Ayurvedhan, Rasayana, Krimighna	11	344
45	Grahani-gajendra Vatika	Grahani	Ing parts 1/25		Vati	Masha		13	399
46	Grahanihara Rasa (i)	Grahani	Swarasa		Rasa	3 Masha Max 3 Ratti		5	400
47	Grahanikapata Rasa (13)	Grahani	Swarasa	1 day	Rasa	1 Masha, 3 Masha		17, 13	117, 390
48	Grahanikapata Rasa (5)	Grahani	Swarasa	7	Rasa	1 Masha		13	390
49	Grahanikapata Rasa (17)	Grahani			Rasa			13	393
50	Grahanikapata Rasa (22)	Grahani		21 days	Rasa	3 Ratti		13	395
51	Grahanisetu Rasa (2)	Grahani	Swarasa	3	Rasa	3 Ratti		13	403
52	Grahanivajrakapata Rasa	Sangrahani		7	Rasa	2 Masha		9	22
53	Sanrahanivajrakapata Rasa, Grahanivajrakapata Rasa (1)	Sangrahani		7	Rasa	4 Masha		9, 13	24, 1
54	Grahaniyari Rasa (1)	Sangrahani	Swarasa/ Kwatha	3 days		2 Masha	Deepana, Pachana, Grahi	11, 13, 17	34, 5
55	Rattibhadra Rasa	Urustambha (Acute transverse myelopathy/ Brown sequard syndrome with demyelination process)	Jala	1 day/ 2 days	Rasa	4 Ratti		16	

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56	Rattigarbha Rasa/Rasayana (2)	Urustambha	Ing 0.25/24 Tola		Vati	2 -4 Ratti		17	
	Rattigarbha Rasa/Rasayana (2)	Urustambha	-		Rasa	4 Ratti		13	
57	Hansapottali Rasa (3)	Sangrahani	Swarasa, Anupana	1	Rasa			17	514
58	Harshpadaya Vati	Vajeekaran	leaf Swarasa	3	Vati	2 Ratti	Balya, Madakara	15	700
59	Indrabrahma Vati	Apasmara (Epilepsy)	-		Vati	1Chanaka		8	488
60	Jatiphala rasa	Atisara	-			1 Ratti	Grahi, Amapachana	11	326
61	Jwarankusha Bruhat	Jwara	-		Rasa	1Chanaka	Jwaraghna	10	161
62	Jwarebhasinha Rasa	Jwara	-		Rasa	2 Ratti		17	308
63	Kakshaputa Rasa	Rasayana	-	1 day	Rasa	1 Ratti	Rasayan, Keshya, Ayurvedha k	13	250
64	Kalanalo Rasa (2)	Sannipata	Kwatha	1	Rasa	1 Masha		13	293
65	Kalashaka processed	Ajeerna	Siddha Jala	1	Shaka	As per diet		24	
66	Kaleshwara Rasa	Shwasa (dyspnoea/ asthma)	-	2 days		1-2 Ratti	Deepana	11, 17	305
67	Kaleshwara Rasa (Mahan)	Kushtha (diseases of skin)	-	1 days	Rasa	1 Ratti: Adult ½ Ratti: child		13	296
68	Kamdeva Pancharatna Churna	Vajeekarana	-	3	Churna		Shukrala, Vajeekar, Rasayana	12	105
69	Kamadeva Rasa (2)	Vajeekarana	Anupana	7	Rasa	3 Ratti , 1Valla (Ratti)		13, 17	262
70	Kanakaprabha Gutika	Sangrahani, Jwaratisara	-	1 day	Gutika	1 Ratti	Deepana, Grahi	9, 18, 11	260
71	Kanaksundara Rasa (5)	Atisara, Jwaratisara	Bhanga Swarasa/ Kwatha as need quantity	(1 prahar)	Rasa	1Chanaka , 1-2 Rati	Deepana, Pachana, Grahi, Laghu	5, 9 , 10 , 11 , 16, 20, 21, 23, 5, 27	204 , 756 ,
72	KanaksundaraRasa (7)	Vidradhi (abscess)	-		Rasa	3 Ratti		9, 13	204 , 243

Sr. No	Formulations (Yoga)	Main Indications (Adhikara)	Type of extract (Kashaya Kalpana) or Anuapana (vehicle)	No/ duration of Bhavana	Dosage form (Kalpana)	Dose (Matra)	Action of Drug (Karmukarwa)	Reference	Page No.
73	Kanaksundara Rasa (2)	Rasayana, Vidradhi, Grahani, Sangrahani	Swarasa	1 yama period	Rasa	1 Chanaka, 1-2 Ratti	Grahi, Deepana, Ruchya, Shoolaghna	13, 7, 17, 20	207, 260, 92
74	Kaphavatari Rasa	Vataroga (diseases due to Vata dosha)	-	1 day	Rasa	8 Ratti		13	219
75	Karpursundara Vati	Atisara	Ing 8/28 parts Bhavana Swarasa		Rasa	1 Kolasthi		17	237
76	Krimikuthara Rasa (4)	Krimi (helminthiasis/ worm infestation)	-	1 day	Rasa	3 Ratti		13	329
77	Krimikuthara Rasa (5)	Krimi	Kwatha	1 day	Rasa	6 Ratti		13	329
78	Kshartamra Rasa	Grahani	-		Rasa			18	293
79	Kshudha Vati	Amlapitta (hyperacidity)	-					11	471
80	Lashuna tailam	Unmada (mania/ psychosis)	-	1 day	Rasa	1 Ratti	Vajeekarana	9	
81	Loha parpati	Hikka (hiccup) Shwasa	-	7	Parpati	1 Masha		8	471
82	Loheshwara Rasa	Vatavyadhi	-	11 days	Rasa			9	105
83	Lokendra Rasa	Jwara	-		Rasa	2 Ratti		18	64
84	Loknatha Rasa	Kaphaja Jwara	-					11	273
85	Mahabhra Gutika	Sangrahani	-			1 Ratti	Deepana, Grahi	11	351
86	Mahajwarantaka Rasa/ Mahajwarnkusha II	Jwara	Swarasa	3 days	Rasa	1-2 Ratti	Deepana, Pachana, Jwaraghna	18, 17	144, 195
87	Mahamruganka Rasa- 36	Rajayakshma (tuberculosis)	-	1	Rasa	3 Ratti		19	171
88	Mahavanhi Rasa	Udara (diseases of abdomen/ enlargement of abdomen)	-		Rasa	1 Ratti		10	762
89	Mahavishamari Rasa	Jwara	-	4	Rasa	3 Ratti		9	114
90	Mahabhra Vati	Grahani, Rajayakshma, Sutikaroga (postpartum diseases)	Swarasa 5 Tola		Vati	2 Ratti	Rasayana	17, 10, 5	207

Sr. No	Formulations (Yoga)	Main Indications (Adhikara)	Type of extract (Kashaya Kalpana) or Anuapana (vehicle)	No/ duration of Bhavana	Dosage form (Kalpana)	Dose (Matra)	Action of Drug (Karmukatawa)	Reference	Page No.
91	Manthanbhairava rasa/ Mahajwarkusha	Sannipata	Swarasa	1 day	Rasa	3 Ratti		17	112 6
92	Martandbhairava Rasa	Sannipata Jwara	-	1 day	Rasa	2 Ratti		6	262
93	Meghnada Rasa	Prameha (urinary disorders)	-	21	Rasa			27	821
94	Mrutsanjeevana Rasa (i), Mrutsanjeevana Rasa IV	Jwara	Swarasa	3 days	Rasa		Jwaraghna	9, 17	68, 252
95	Mrutsanjeevana Rasa (iii)	Jwaratisara	-		Rasa	3 Ratti		18, 21	277
96	Mrutsanjeevana Vatika	Jwara	Swarasa	1 day	Vati	1 Chanaka		17, 22	253
97	Mrutsanjivani Rasa (II)	Jwara-Atisara	Kwatha	3 days	Rasa	1 Ratti		8	259
98	Mrutyuvighatana Rasa	Jwara	-	3 days	Rasa	1 Ratti		18	92
99	Nagsundara Rasa	Atisara	-	3 days		1 Badara	Grahi	11, 18	207, 328
100	Narimatta gajankusha Rasa	Prameha	-		Rasa			17	244
101	Navratnarajmrug anka/ Rajamruganka Rasa	Mahakshaya, Kshaya (emaciation)	-	7	Rasa	1 Ratti		21, 18, 24, 27	172
102	Navratnarajmrug anka Rasa	Vatavyadhi	Swarasa	7	Rasa	1 Ratti		10	92
103	Nidrodaya Rasa	Anidra (insomnia)	Swarasa	3	Rasa	2 Ratti	Nidrajana n	15, 16	698, 369
104	Pachaka Rasa	Jwara	Swarasa (1 Pala)		Rasa	1 Chanaka		9	81
105	Panchabana Rasa	Alpashukra (deficiency of semen)	-	21	Rasa			17	409
106	Panchasayaka	Vajeekarana	-	1	Rasa			17	412
107	Parijata Tankanam (Talakeshwara)	Swarabheda (hoarseness of voice)	Swarasa	7	Rasa	1 Ratti		13	
108	Parpati Rasa	Sarvarogahara	-	7	Rasa	2 Masha		20, 25	254
109	Pottali Rasa	Grahani	-	1 day	Rasa			18	220
110	Prabhavati Vati (Rasa)	Vataroga	Swarasa/ Kwatha	1	Vati			5	438

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111	<i>Pramadebha ankushsa</i>	<i>Rasayana, Vajeekarana</i>	<i>Beeja taila</i>	5	<i>Rasa</i>	6 Ratti		13	
112	<i>Pratapa ravana Rasa</i>	<i>Kamala, Pandu</i>	-	7	<i>Rasa</i>	1 Ratti		18	119
113	<i>Prataplankeshwara Rasa</i>	<i>Sannipata Jwara, Vatavyadhi, Pandu</i>	-	7	<i>Rasa</i>	1 Ratti		16, 17, 11, 19	247, 507, 88
114	<i>Prataplankeshwara Rasa Shri</i>	<i>Vishamjwara, Kaphaja Jwara</i>	-	6- 7 days	<i>Rasa</i>	1 Tandula /1 Ratti		9, 11, 8	347, 320
115	<i>Pushpadhanwa Rasa</i>	<i>Vajeekarana</i>	-	1	<i>Rasa</i>			10	1123
116	<i>Rajamruganka Rasa IV</i>	<i>Yakshma</i>	<i>Swarasa</i>	7	<i>Rasa</i>	1 Ratti	<i>Balya, Bruhana</i>	17	441
117	<i>Rajtaleshwara Rasa</i>	<i>Kushtharoga</i>	-	2 days	<i>Rasa</i>	2 Valla		8	613
118	<i>Rasa parpati</i>	<i>Rajyakshma, Kasa</i>	<i>Swarasa</i>	7	<i>Parpati</i>	2 Masha		17, 18, 20	406
119	<i>Rasanagadi Rasa</i>	<i>Agnimandya</i>	<i>Ing 20/76parts; Bhavana</i>		<i>Rasa</i>	¼ Tola	<i>Deepana, Pachana</i>	18	296
120	<i>Rasendrachudamani Rasa</i>	<i>Vajeekarana</i>	<i>Swarasa</i>	7	<i>Rasa</i>	2 Masha		5	563
121	<i>Rasendragutika (Bruhat)</i>	<i>Rajyakshma</i>	-		<i>Gutika</i>	2 Ratti		10	422
122	<i>Sangrahani hara Rasa (i)</i>	<i>Grahani</i>	-	7	<i>Rasa</i>	3 Ratti		18	226
123	<i>Sannipatabhairava Rasa</i>	<i>Sarvajwara (all diseases)</i>	-		<i>Rasa</i>	4 Masha		21, 27	1546
124	<i>Sannipata krutantaka Rasa</i>	<i>Kaphaja Jwara</i>	-	7		1 Chanaka		11	264
125	<i>Sannipata surya Rasa</i>	<i>Kaphaja Jwara</i>	-	3 days	<i>Rasa</i>	2 Ratti		11, 18	87
126	<i>Sarvangsundara Rasa (9)</i>	<i>Shoola</i>	-			1 Masha		11, 8, 17	474, 530, 334
127	<i>Sarvangsundara Rasa (5)</i>	<i>Shoola</i>	<i>Kwatha</i>	1	<i>Rasa</i>	4 Ratti		27, 17	332, 637
128	<i>Sarvarogya Rasa</i>	<i>Sarvaroga (all disease)</i>	<i>Ing 4 Tola</i>		<i>Rasa</i>	2 Ratti	<i>Deepana</i>	18	234
129	<i>Sarveshwara Rasa</i>	<i>Kshaya</i>	-	3 days	<i>Vati</i>			9	60
130	<i>Sarveshwara Rasa (6)</i>	<i>Prameha</i>	<i>Swarasa</i>		<i>Rasa</i>	2 Ratti		16, 17	341
131	<i>Shankhodara Rasa</i>	<i>Kshaya</i>	<i>Bhavana & Anupana</i>	7	<i>Vati</i>	1 Ratti		9	56

Sr. No	Formulations (Yoga)	Main Indications (Adhikara)	Type of extract (Kashaya Kalpana) or Anuapana (vehicle)	No/ duration of Bhavana	Dosage form (Kalpana)	Dose (Matra)	Action of Drug (Karmukatawa)	Reference	Page No.
132	Sheeta Kesari Rasa	Vishamjwara	-					11	301
133	Shleshmashailedra Rasa	Kaphaja Roga, Vatavyadhi	-	1	Rasa		Deepana	11, 8	465
134	Shwaskaleshwar Rasa	Shwasa	-	21	Rasa	Adult:2 Ratti Child, old age:1 Ratti		27	506
135	Sinduradi Vati/ Sinduradi Yoga	Klaibya (erectile dysfunction), Vajeekarana	Ing 1/13part Bhavana (Kwatha)		Rasa	1 Ratti		17	359
	Sinduradi Vati/ Sinduradi Yoga		1/9parts (1:1), Swarasa, Anupana	1 prahara	Rasa	1 Badara		9	290
136	Somapani Rasa	Sannipata	Swarasa (4 Tola)/ Kwatha	1	Rasa	1 Chanaka		13, 6, 17	557, 263, 390
137	Stambhana Vatika (2)	Vajeekarana	-	10	Gutika	1 Badarasthi		17	226
138	Suvarnasundara Rasa	Atisara	-	1Yama	Rasa	2 Ratti		18	219
139	Swacchandnayaka Rasa (Pratham)	Kaphaja Jwara, Abhinyasa Jwara (meningitis), Rasayana	Swarasa	3 days	Vati	½ Ratti, 1 Masha		11, 6, 8, 16, 13	270
140	Swalpanayika Churna/ Lai Churna	Sangrahani	Ing 55g/148g, Churna Bhavana1 Pala	1	Churna	1 Masha		6	195
141	Tandavari Loha	Tandavroga (disease due to amenorro-hoea and worm infesatation)	Swarasa	7	Vati	2-6 Ratti		10, 16	115 5
142	Trailokya tilako Rasa	Arsha (haemorrhoids), Jwara	-	7	Rasa	1 Ratti		11, 9	361,
143	Trimurta Rasa	Grahani	-	3 days	Rasa	¼ Tola		18	219
144	Udaradi Rasa (6)	Udara, Rasayana	Anupana	3	Rasa	1 Ratti		13	173
145	Vaidyanatha Vati	Grahani, Sangrahani	Swarasa (5Masha)		Vati	1Sarshapa	Grahi, Deepana, Jwaraghna	8, 17	342, 808
146	Vajrakapata Rasa	Sangrahani	-	8	Rasa	3 Masha	Grahi, Deepana	17	713
147	Vajrakapata Rasa II	Grahani	-	7 or till dry	Rasa	3 Ratti		16	276

Sr. No	Formulations (Yoga)	Main Indications (Adhikara)	Type of extract (Kashaya Kalpana) or Anuapana (vehicle)	No/duration of Bhavana	Dosage form (Kalpana)	Dose (Matra)	Action of Drug (Karmukatawa)	Reference	Page No.
148	Vajrakapata Rasa	Sangrahani	Ing 12/24parts, Bhavana	7	Rasa	1 Nishka		20	713
149	Vatajwarari Rasa	Jwara	-	7	Rasa	2 Ratti	Jwaraghna	9, 17	26, 741
150	VatamehantakaRasa	Prameha	Kwatha/Swarasa	1 day	Rasa	2 Ratti	Aashu, Vyavayi	17, 4	742, 187
151	Vatvidhwansana Rasa	Sutika vata (neurological disorder of puerperal fever)	-	1	Rasa	1 Ratti		20, 25	195,
152	Vedanantaka Rasa	Shoola	Swarasa		Rasa	2 Ratti	Shoolaghna	15, 16	698
153	Veeryastambhana Vati	Vajeekarana	Swarasa	9	Vati	-	Shukrala, Stambhana	26	612
154	Vijaya Rasa	Ajeerna	-	1	Rasa	1 Nishka	Deepana, Pachana	8, 17	399, 761

(Ing -Ingredients)

All the ayurvedic clinical conditions are correlated with modern diseases as per API. (30) References of their conversion may be followed as per API in today's era.

(1Ratti=125mg, 1 Masha=1 g, 1 Kalaya=size of a green pea, 1 Chanaka=size of a chickpea, 1 Badara=size of a ziziphus fruit, 1 Badarasthi= size of a ziziphus seed, 1 Valla=, 1 Tandula=, 1 Tola=12g, 1 Nishka=4 g, 1 Sarshapa=3.90mg)

Rasa- metallic or herbomineral prepearions, Vati, Gutika-Tablets, Shaka-vegetables, Leha-semi-solid jaggery based medicine for licking, Parpati-crust medicine form, Swarasa-expressed juice, Kwatha-decoction, Anupana-vehicle, Siddha Jala-medicated water

1 prahara-3 hours, 1 yama-3 hours

All the 154 formulations containing *Bhanga* as processing media are indicated for internal administration. *Rasayogasagara* has quoted highest formulations containing *Bhanga* as *Bhavana* media followed by *Bruhatrasarajasundara* and *Rasajalanidhi*. It is observed; commonly *Swarasa* (expressed juice) of *Bhanga* is used for levigation than *Kwatha* (decoction). In 46 formulations *Swarasa* of *Bhanga* is used whereas in 11 formulations decoction is used, for levigation. In nine formulations like *Ajeernari Rasa*, *Grahanigajendra Rasa*, *Grahanigajendra Vatika*, *Ratigarbha Rasa*, *Karpursundara Vati*, *Rasanagadi Rasa*, *Sinduradi Vati*, *Swalpanayika churna*, *Vajrakapata rasa Bhanga* is used as ingredient as well as *Bhavana*. In *Hansapottali Rasa* (3), *Kamadeva Rasa* (2), *Shankhodara Rasa*, *Udaradi Rasa* (6)it is used as *Anupana* (vehicle) along with *Bhavana*.

Table 2: Time and duration of administration of *Bhanga* (*Cannabis sativa* Linn.) containing formulations

Sr. No	Formulations	Time/Duration of administration (Bheshaja Kala)	Sr. No	Formulations	Time/Duration of administration
1	Ajeernari rasa, Kamdeva rasa (2)	Morning	8	Gangadhara rasa/kutaja leha	1 month
2	Kanakasundara Rasa (2)	Morning and evening	9	Harshapadya vati	1 month
3	Rasendrachudamani Rasa	Afternoon 3rd Prahara i.e.3pm & Night 1 st Prahara for 3 months	10	Meghanada Rasa	3 months
4	Rasendragutika (Bruhat)	after digestion of food	11	Swalpanayika/Lai churna	increasing dose
5	Sinduradi Vati/Sinduradi Yoga	1 hour before intercourse			
6	Stambhana Vatika (2)	Night			
7	Vatvidhwansana rasa	Morning and night			

Table 3: Various parts of *Bhanga* (*Cannabis sativa* L.) used for levigation procedure

No	Formulation	Part used	No	Formulation	Part used
	<i>Abhra Vatika I</i>	Leaf	10	<i>Kanaksundara Rasa (2)</i>	Leaf
	<i>Ananda Rasa</i>	Leaf	11	<i>MahaJwarantaka Rasa/ Mahajwarnkusha II</i>	Leaf
	<i>Bruhatchintamani Rasa</i>	Seed	12	<i>Mrutyuvighatana Rasa</i>	Leaf
	<i>Dwijiupti Rasa</i>	Leaf	13	<i>Nidrodaya Rasa</i>	Leaf
	<i>Gangadhara Rasa (2)/ Kutaj leha</i>	Seed oil	14	<i>Pratapa ravana Rasa</i>	Leaf
	<i>Grahanigajendra Rasa</i>	Seed	15	<i>Pramadebha ankushsa</i>	Seed oil
	<i>Harshpadaya Vati</i>	Leaf	16	<i>Rasendragutika (Bruhat)</i>	Leaf
	<i>Jatiphala rasa</i>	Leaf	17	<i>Swalpanayika churna/ Lai churna</i>	Leaf
	<i>Kanakprabha Gutika</i>	Leaf	18	<i>Vedanantak Rasa</i>	Leaf

In case of many formulations authors of various texts are silent about the parts used of *Bhanga*. However in 18 formulations the parts used for *Bhavana* process has been clearly noted. In total 15 formulations leaves are used for levigation and in 3 formulations seeds are used. Leaf, seed, seed oil are the common useful parts of *Bhanga*. Chronic and high dose use of *Bhanga* produces psychotoxic withdrawal effects like anger, aggressiveness, restlessness, irritability and anxiety etc. (32) As the leaf contains less psychoactive substance than resin, it may be used as *Bhavana* drug and it can be considered as levigation media where part is not explained (*Anukta*). (33)

Marijuana is obtained from leaves, stem and dried flower buds while 'hasisha' a resinous part is procured from flowering buds. As leaf contains less THC (psychoactive content) and more cannabidiol (non psychoactive) alkaloid than resin and buds, they can be easily used in required amount in pharmaceutical procedures without harmful effects. Leaves of *Bhanga* contains olivetol synthase, geranyl diphosphate, CBCA (Cannabichromenic acid) synthase, CBDA (cannabidiolic acid) synthase, CBGA synthase (Cannabigerolic acid) delta-9 THCA synthase. (34) Seed of *Cannabis sativa* contains low amount of THC than leaves while seed kernel is devoid of THC. Cannabis seed contains both saturated and unsaturated types of substances. The oil of the hempseed was found to be well balanced with regard to the ratio of omega-3- to omega-6 fatty acids for human nutrition. (33) Thus, it can be used as dietary source within prescribed limits.

Table 4: Indications wise classification of formulations levigated with *Bhanga* along with dosage form, dose range, type and number of *Bhavana* used.

No	<i>Adhikara</i>	T. F.	Dosage forms (<i>Kalpana</i>)	Dose (<i>Matra</i>)		Type of <i>Bhavana</i>	Maximum <i>Bhavana</i> used	Ref
				Maximum	Minimum			
1	<i>Grahani</i> (Malabsorption syndrome)	17	<i>Vati, Rasa</i>	1 <i>Sarshapa</i>	4 <i>Masha</i>	<i>Swarasa</i> (5 <i>Masha</i> /5 <i>Tola</i>)	7-21 days	13, 8, 17
2	<i>Jwara</i>	13	<i>Rasa</i>	1 <i>Chanaka</i>	3 <i>Ratti</i>	<i>Swarasa</i> (1 <i>Pala</i>), <i>Kwatha</i>	3-7 days	8, 17, 18, 17, 9
3	<i>Sangrahani</i>	13	<i>Rasa, Vati</i>	1 <i>Sarshapa</i>	4 <i>Masha</i>	<i>Swarasa</i> (5 <i>Masha</i>), <i>Kwatha</i>	3-7	6, 8, 17
4	<i>Atisara</i>	11	<i>Rasa</i>	1 <i>Kolasthi</i>	1 <i>Badara</i>	<i>Swedana, Swarasa, Anupana, Churna</i>	3-7 days	13
5	<i>Rasayana</i>	10	<i>Parpati, Rasa, Vati</i>	1 <i>Chanaka</i>	1 <i>Masha</i>	<i>Swarasa, Kwatha</i>	1-2 days	13
6	<i>KaphajaJwara</i>	8	<i>Rasa</i>	1 <i>Tandula</i>	3 <i>Ratti</i>	<i>Swarasa</i>	1-3 day	11, 6, 8, 16, 13
7	<i>Jwaratisara</i>	7	<i>Gutika, Rasa</i>	1 <i>Chanaka</i> , 1 <i>Kalaya</i>	3 <i>Ratti</i>	<i>Bhanga Swarasa/ Kwatha</i> quantity as per need	(1 <i>prahara</i>)	5, 9, 10, 11, 16

No	Adhikara	T. F.	Dosage forms (Kalpana)	Dose (Matra)		Type of Bhavana	Maximum Bhavana used	Ref
				Maximum	Minimum			
8	Vatavyadhi	7	Rasa	1 Ratti	8 Ratti	Swarasa, Kwatha	1-11 days	13, 5,9
9	Vajeekarana	6	Rasa	1 Badara	1 Ratti	Kwatha	1-7	9, 13, 21, 17
10	Shoola	6	Rasa	1 Chanaka	1 Masha	Swarasa, Kwatha	1	21, 17
11	Sannipata	5	Rasa	1Tandula	1 Masha	Swarasa, Kwatha	3	13
12	Rajyakshma	4	Vati, Parpati	2 Ratti	2 Masha	Swarasa 5 Tola		17, 21, 18
13	Kshaya	4	Rasa, Vati	1 Ratti		Bhavana & Anupana	7	9, 21, 18
14	Vishamjwara	3	Rasa	1Tandula	1 Ratti		6- 7 days	9, 11, 18
15	Kasa	3	Rasa, Parpati	1 Kalaya	2 Masha	Swarasa (1Tola)	7	10, 17, 18, 20, 11
16	Urustambha	3	Rasa, Vati	2Ratti	4 Ratti	Jala 1 day/ (2 days)		16, 13, 14
17	Shwasa	3	Rasa	Child, old age:1Ratti	Adult:2 Ratti	21	21, 2 days	11, 17
18	Prameha	3	Rasa	2 Ratti	-	Swarasa, Kwatha	1-2 day	16, 17, 4, 8
19	Pandu	2	Rasa	1 Ratti	-	-	7	18
20	Kushtha	2	Rasa	2 Ratti	2 Valla	Swarasa	1-2 day	8
21	Vidradhi	2	Rasa	1 Chanaka	3 Ratti	Swarasa	1 yama period	13, 7, 17, 20, 46, 18, 18
22	Krimi	2	Rasa	3 Ratti	6 Ratti	Kwatha	1 day	13
23	Udara	2	Rasa	1 Ratti	-	-	3	13
24	Sutika	2	Rasa	1 Ratti	-	Swarasa 5 Tola	1	17, 20
25	Ajeerna	2	Rasa	1 Nishka	-	-	1	8, 17
26	Agnimandya	2	Rasa	3 Ratti, 1/4 th Tola	1 Tola	Kwatha, Swarasa (1/4 th Tola)	18	
27	Kamala	1	Rasa	1 Ratti	-	-	7	18
28	Amavata	1	Rasa	-	½Masha	Swarasa	7	
29	Sarvajwara	1	Rasa	-	4 Masha	-	-	21
30	Abhinyasa Jwara	1	Vati	½ Ratti	1 Masha	Swarasa	3 days	11, 6, 8, 16, 13
31	Apasmara	1	Vati	1 Chanaka	-	-		8
32	Amlapitta	1	Vati	-	-	-	-	11
33	Unmada	1	Rasa	1 Ratti	-	-	1 day	9
34	Hikka	1	Parpati	1Masha	-	-	7	8
35	Anidra	1	Rasa	2 Ratti	-	Swarasa	3	15, 16
36	Sarvaroga	1	Parpati rasa	2 Masha	-	-	7	20.
37	Klaihya	1	Rasa	1 Ratti	-	-	1 prahara	9
38	Tandavroga	1	Vati	2Ratti	6 Ratti	Swarasa	7	10, 16
39	Arsha	1	Rasa	1 Ratti	-	-	7	11, 9
40	Alpashukra	1	Rasa	-	-	-	21	17

(T.F. Total formulations)

Rasa- metallic or herbomineral preparations, *Vati*, *Gutika*-Tablet, *Parpati*-crust medicine form, *Swarasa*-expressed juice, *Kwatha*-decoction, *Anupana*-vehicle,

1 *prahara*-3 hours, 1 *yama*-3 hours

Formulations levigated with *Bhanga* are used in total 40 disease conditions. Out of these maximum formulations are found in *Jwara* (33) followed by *Grahani* (17), *Sangrahani* (13) and *Atisara* (11) management. Total 33 formulations are mentioned in different types of *Jwara* i.e. *Kaphaja Jwara* (8), *Vishamajwara* (3), *Sarvajwara* (1), *Abhinyasa Jwara* (1), *Jwaratisara* (7) and *Jwara* (13) *Adhikara* (indications) explaining its broad spectrum activity. Mostly *Rasa* and *Vati* are dosage forms where Cannabis is used as trituration media. However, in *Parpati* forms are also triturated with Cannabis and used in *Rajayakshma*, *Sarvaroga*, and *Hikka* and as a *Rasayana*. Minimum doses used are 1 *Tandula* and 1 *Sarshapa* in *Kaphaja Jwara* and *Grahani*, *Sangrahani* respectively. Maximum doses 4 *Masha* in *Grahani*, *Sangrahani* followed by 8 *Ratti* in *Vatavyadhi* and 6 *Ratti* in *Krimi*. The formulations are mostly triturated with *Swarasa* of *Bhanga*. *Kwatha*, *Churna* (fine powder) and *Bhanga Siddha Jala* (water medicated with cannabis) are also used for trituration. Maximum 21 times cannabis levigated formulations indications are found in *Grahani*, *Shwasa* and *Alpashukra* conditions while 18 times in *Agnimandya*.

The drug can be easily administered upto maximum doses of 8 *Ratti* to 4 *Masha*. Minimum 1 *Tandula* dose also suggested therapeutically effective. On close analysis of various texts; it is observed that for the same clinical condition, there is dose variations. Thus in this paper an attempt has been made to define minimum and maximum dose for the disease by observing doses of formulations suggested for that particular disease condition. It is found that dose of a formulation varies as per variation in content and number of levitations.

***Vajeekarana* (Erectile dysfunction):**

Erectile dysfunction is most common type of sexual dysfunction in men. Many medical conditions such as high blood pressure, diabetes, blood vessel diseases, surgery that affects bladder or genitals, nerve disease or injury, hormonal problems, depression etc causes erectile dysfunction. (35) *Bhanga* is attributed with qualities of *Vajeekarana* and indicated in management of *Klaibya*. Studies examining the effects of cannabis use on male sexual function have been limited in both quality and quantity. However, recent animal and in vitro studies have identified potential links between cannabis and sexual health. It appears that cannabis may actually have peripheral antagonizing effects on erectile function by stimulating specific receptors in the cavernous tissue. (36)

In *Kanaksundara rasa* (II) leaves are used for levigation and the formulation can be administered within dose of 1 *Chanaka* to 2 *Ratti* as per severity of disease. *Rasendrachudamani rasa* is indicated for

Shukrala and *Vajeekarana* effect has given specific time of administration i.e. afternoon 3 *Prahara* i.e. 3 pm and night 1st *Prahara*. (Table 2) *Sinduradi Vati* mentioned as *Vajeekarana* and *Veeryastambhana* purpose should be administered before intercourse along with milk or *Bhanga rasa* for quick effect of drug. Thus *Bhanga* is a good drug of choice in maintaining healthy sexual lifestyle for men. *Stambhana Vati* and other *Vajeekarana* formulations can be administered on the same principle.

***Grahani* (Malabsorption syndrome), *Sangrahani* (irritable bowel syndrome), *Atisara* (diarrhoea) :**

Gangadhara Rasa (*Kutaja leha*) is indicated in *Raktaja Grahani*. It is used in *Leha* form in painful conditions of Malabsorption syndromes (*Grahani* with *Shoola*). *Meghanada rasa* in which 21 *Bhavana* are used is indicated in *Prameha* (Diabetes) along with honey, suggesting the long term administration in chronic disease. There are many formulations on the name of *Lai Churna* (*Lai powder*) in classics which contains *Bhanga* as a main ingredient. These formulations are indicated in *Sangrahani*, *Grahani*, *Atisara* conditions. *Swalpanayika churna* or *Lai churna* in which leaves are used as *Bhavana* media has been advised to administered in increasing doses for the management of *Sangrahani*. The formulation also have *Rasayana* effect on *Grahani Dosh*. For increasing potency along with *Bhanga Ahiphena* (*Papaver somniferum* L.) or *Dhatu* (*Dhatu metel* L.) are used as *Bhavana* media e.g. *Bhanga* and *Dhatu* are used as *Bhavana* media in *Parijata Tankana* (*Talakeshwara Rasa*), *Pugapaka* (27), *Prataplankeshwara Rasa* (*Sannipata Jwara*, *Vatavikara* (13), *Pramadebha-ankusha Rasa* (*Vajeekarana*) (13), *Mruganka Rasa* (*Kshaya*) (13), *Rasaraja Rasa* (*Jwara*) (13), *Agnimukha Rasa* (*shoola*) (13), *Atisarebha Rasa* II (13) (*Atisara*), *Anandbhairava Rasa* (XII) (*Agnimandya*), *Kakshaputa Rasa*, *Krumikuthara Rasa* (IV) (*Krimi*), *Gunjagarbha Rasa* (2) (*Urustambha*), *Swacchandnamaka Rasa* (*Kaphaja Jwara*) (11), *Loknatha Rasa* (*Kaphaja Jawra*), *Bhairava rasa* (*Kaphaja Jwara*), *Mahabhra Gutika* (*Sangrahani*) (11), *Shleshmashailedra Rasa* (*Kaphaja roga*), *Sarvansundara Rasa* (*Shoola*) (11). Cannabis and atropine have synergistic action on GIT. Atropine the constituent of *Dhatu* has anticholinergic action and cannabinoids potentiate it without any side effects. (33) *Bhanga* and *Ahiphena* both used in *Bhavana* media in *Aghoresha Gutika* (*Veeryastambhana*, *Vajeekarana*) (13). In *Sangrahanihara Rasa*, *Ahiphena* is levigated with cannabis juice extract seven times. In many formulations *Ahiphena* is used as ingredient levigated with *Bhanga*. There is close relationship between m-opioid (MOP) and cannabinoid CB1 receptors which may directly influence protein-protein interactions. (Rios et al. (2006) [37]) Research studies provides solid evidence for the existence of a potential cross-talk

between opioids and cannabinoids in brain motivational systems. Thus suggesting the existence of functional interactions between the endogenous cannabinoid system and the endogenous opioids signaling systems. [38] Cannabinoids and opioids share several pharmacologic properties including anti-nociception; a tendency to induce hypothermia, sedation, and hypotension; inhibition of intestinal motility and locomotor activity. Though mechanism is different but it's closely related. Cannabis appears to slow morphine absorption such that maximal concentrations for a dosing interval are lower. The effect of inhaled cannabis in enhancing opiate analgesia is most likely achieved through a pharmacodynamics mechanism. These results suggest that further controlled studies of the synergistic interaction between cannabinoids and opioids are needed. [39] Both *Ahiphena* and *Dhatuira* used as *Swedana* media in *Purnendu Rasa* (14) (Table 5)

In the present study it is observed that a wide application of cannabis triturated formulations in *Jwara*, *Sangrahani*, *Grahani*, *Atisara* i.e. the disease of gastrointestinal tract. *Grahani* and *Sangrahani* symptoms shows resemblance with inflammatory bowel disease (IBD). IBD refers to both ulcerative colitis and crohn's disease. Ulcerative colitis causes inflammation of the lining of the large intestine, while crohn's disease causes inflammation of the lining and wall of the large and/or small intestine. The immune system changes that accompany IBD suggest that it may be an immune disorder. Research demonstrates that cannabis and cannabinoids are effective in treating the symptoms of these GI disorders in part because it interacts with the endogenous cannabinoid receptors in the digestive tract, which can result in calming spasms, assuaging pain and improving motility. Cannabis has also been shown to have anti-inflammatory properties and recent research has demonstrated that cannabinoids are immune system modulators, either enhancing or suppressing immune response. [40]

Recent laboratory research on the endogenous cannabinoids system in humans has identified that there are many cannabinoid receptors located in both the large and small intestine. Cannabis and new cannabinoid drugs are attractive for GI treatment because they can address a number of symptoms at once with minimal side effects. Cannabinoids alter how the gut feels, affect the signals the brains ends back and forth to the gut, and modulate the actions of the GI tract itself. In a randomized trial, THC significantly improved appetite and nausea in comparison with placebo. There were also trends towards improved mood and weight gain. Cannabis helps combat the painful and often debilitating cramping that accompanies many GI disorders because cannabinoids relax contractions of the smooth muscle of the intestines. Cannabinoid receptors comprise G-protein

coupled receptors that are predominantly in enteric and central neurones (CB1R) and immune cells (CB2R). The digestive tract contains endogenous cannabinoids (anandamide and 2-arachidonylglycerol) and cannabinoid CB1 receptors can be found on myenteric and submucosal nerves. Activating cannabinoid receptors has been demonstrated to inhibit gastrointestinal fluid secretion and inflammation in animal models. (41)

Jwara (Pyrexia):

Bhanga is used as a triturating agent only in the formulations indicated in *Kaphaja Jwara*. In *Pittaja* condition the drug is contraindicated.

Pandu (anaemia), Kamala (jaundice):

Few formulations are mentioned in *Pandu* and *Kamala* which are *Pitta* predominant diseases (Table 4) in a dose of 1 *Ratti* (125 mg). The formulations seems to have better significance in *Rasavaha* (lymphatic system) and *Annavaha strotasa Dushti* (gastrointestinal diseases) conditions as indicated in *Jwara*, *Atisara*, *Grahani*, *Amavata* etc. *Pandu* and *Kamala* do vitiate *Rasavaha* and *Raktavaha strotasa* (circulatory system). As *Bhanga* contraindicated in *Pittaja* conditions, anemia caused due to *Rasavaha strotasa* vitiation can be cured with *Bhanga*.

Kasa (Cough), Hikka (Hiccup), Rajayakshma (Tuberculosis, emaciation):

Pranavaha strotasa (Respiratory system) diseased conditions like *Kasa*, *Hikka*, *Rajayakshma* can also be treated by the *Cannabis* formulations. *Kaleshwara rasa* triturated with *Bhanga* for one day can be used in *Shwasa* condition of child in the dose of half *Ratti* with *Adraka swarsa* (juice of ginger).

Manasroga (Psychosomatic diseases):

The formulations like *Lashuna tailam*, *Indrabrahma Vati*, *Tandavari Loha* are indicated in diseases *Unmada*, *Apasmara*, *Tandavaroga* respectively which are psychosomatic in nature. The drug has effect on *Manovaha strotasa* (mind). It is well established mood elevator, memory enhancer. *Anidra*, *Klaibya* are sometimes have psychological causes. The formulations like *Nidrodaya Rasa* and *Sinduradi Vati* which contains *Bhanga* are thus useful. The activity of Cannabis is psychosomatic in nature. Thus further it can be therapeutically applied in anorexia nervosa like conditions. *Vatavidhwansana Rasa* triturated with 5 *Tola Swarasa* of *Bhanga* is mentioned in *Sutika Vata* condition in the dose of 1 *Ratti* (125mg).

Table 5: *Bhanga* (*Cannabis sativa* Linn.) as a *Swedana* (boiling) media

Sr. no	Formulation (Yoga)	Main Indication (Adhikara)	Indications (Phalashrut)	Swedana (boiling)	Dosage form (Kalpana)	Dose (Matra)	Vehicle (Anupana)	Ref
1	<i>Aghoresha Rasa</i>	<i>Vajeekarana</i>	<i>Veeryastmbh ana, Vajeekarana</i>		<i>Rasa</i>		Banana, <i>Guda</i> (jaggary)	13
2	<i>Chakrabaddha Rasa (1)</i>	<i>Vajeekarana</i>	<i>Veeryapushti, Agnimandya</i>	1/2 <i>prahara</i>	<i>Rasa</i>	3 <i>Rati</i>	<i>Maricha+</i> <i>Ghruta</i>	13
3	<i>Purnendu Rasa</i>	<i>Vajeekarana</i>	<i>Vajeekarana</i>	1 day	<i>Rasa</i>	3 <i>Ratti</i>	<i>Karpasa-</i> <i>Majja</i> (seedpulp)	13

Swedana (boiling) is a process carried out for *Shodhana* (detoxification) of metals used in Ayurveda. In *Chakrabaddha rasa Chitraka* (*Plumbago zeylanica* Linn.), *Bhanga*, *Shigru* (*Moringa olifera* Linn.) all *Ushna*, *Tikshna* drugs, are used as boiling media. The formulation is indicated as appetizer, digestive, aphrodisiac etc. In *Purnendu Rasa* mercury is boiled with 55 medias containing *Bhanga*, *Ahiphena*, *Dhatu*, *Chitraka*, *Jyotishmati* (*Celastrus panniculatus* Linn.) etc. (13) The boiling with *Bhanga* may be to detoxify the metals and increase its affinity for particular action.

Formulations containing *Bhanga* as an ingredient are indicated in 29 disease conditions while as a *Bhavana* media are indicated in 40 disease conditions. (42) This suggest that, drug is mostly used as a levigation media to make formulations more potent.

Cautions:

The formulations containing *Bhanga* are indicated in diseases of child as well as post pregnancy period. However; no formulations found in which it is indicated in pregnancy.

Conclusion

Total 157 formulations were found where *Bhanga* is used as a pharmaceutical processing agent. Levigation with *Bhanga* may be to activate receptor mediated endocannabinoid system to avail the broad spectrum advantages of *Cannabis sativa* Linn. More than 150 formulations reported in present available *Rasa* and *Chikitsa grantha* texts are levigated with *Bhanga*.

The formulations levigated with *Bhanga* can be effectively applied in the management of clinical conditions like *Jwara* (pyrexia), *Agnimandya* (digestive impairment), *Ajeerna* (indigestion), *Grahani* (malabsorption syndrome), *Sangrahani* (irritable bowel syndrome), *Atisara* (diarrhoea), *Vatavyadhi* (diseases due to vitiated *Vata*), *Shoola* (Painful conditions), *Shirashoola* (headache), *Kshaya* (emaciation), *Rajayakshma* (Tuberculosis), *Shwasa* (Asthma), *Kasa* (Cough), *Urustambha* (Acute transverse myelopathy/ Brown Sequard syndrome with demyelination process), *Prameha* (Diabetes), *Shotha* (edema), *Hikka* (hiccup), *Pandu* (Anaemia), *Kushtha* (Skin diseases), *Krimi* (worm infestations) and various psychosomatic diseases etc.

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Conflict of interest

The authors declared no conflict of interest.

References

1. Acharya YT. Charaka Samhita, Vimana Sthana 1 (21-22), Reprint edition, Varanasi: Chaukhambha Orientalia; 2004, p. 235.
2. Ramaraksha Pathak. Ayurveda Sara Sangraha. 12th edition. Shri Vaidyanath Ayurveda Bhavana limited; 2012. 18.
3. a) Bhavamishra commentary by K.C. Chunekar edited by G.S. Pandey, Bhavaprakasha Samhita, revised and enlarged edition, Chaukhambha Vishwabharati, 2010.137p
b) Adhamalla's Dipika and Kashirama's Gudarth dipika, commentator, Pd Parsurama Sastri, Vidyasagar, editor, Pd sharangadharacharya, Sharangadhara samhita, Seventh edition, Varanasi, Chaukhambha orientalia, Purvakhanda 2/5-8
4. Acharya Yashoddhara translated by Siddhinandana Mishra, Rasaprakashasudhakara, 2nd edition, Varanasi, Chaukhamba Orientalia, 1998.
5. Shastri Ambikadutta., Vagbhata Rasaratnasamucchaya. 9th edi. Varanasi; Chaukhambha Amarabharati Prakashan. 2010.
6. Acharya AnantadevSoori with Siddhiprada Hindi commentary, Prof. Siddhinandana Mishra, Rasachintamani, 2nd edition, Varanasi, Chaukhamba publishers, 2003
7. Acharya Dhundhuknath with 'Siddhiprada' commentary, Hindi translated by Prof. Siddhinandan Mishra, Rasendrachintamani, 1st edition, Varanasi, Chaukhamba orientalia, 2000.
8. Ramatej Pandey and Neelakantha Mishra, Rasendrasarasamgraha with Rasayanihindi commentary, 4th edition, Delhi, Chaukhamba Sanskrit Pratisthana, Reprint 2000
9. Sri Chudamani Mishra, fourth cikitsapada with "Suvivrtti" hindi commentary, by Sri Gulraj Sharma Mishra and Vd. Santosh Kumar Sharma,

- Rasakamdhenu, 2nd edition, Varanasi, Chaukhamba Orientalia, 1999.
10. Prof. Siddhinandan Mishra, editor, Kaviraj Govind Das sen, Bhaishajya Ratnavali, 1st edition, Varanasi, Chaukhambha surabharati Prakashan, Reprint 2011.
 11. Pandit Dattaram Chobe, Bruhat Rasarajasundara, 3rd edition, Varanasi, Chaukhambha Orientalia, 2000.
 12. Bhagat Bhagwandas, Rasaraja mahodadhi. 1st edition. Mumbai; Khemraj Shrikrishnadas Prakashan. 2010.
 13. Rasayogasagara, Vaidya Pandit Hariprapannaji with Sanskrit and English introduction & Notes, Vol. 1, Varanasi, Choukhambha Krishnadas Academy, 2010.
 14. Bhatt Krishnaram. Siddhabheshaja manimala. 3rd edition. Varanasi; Chaukhambha Krishnadas academy.2003.
 15. Shree Sadanand Sharma edited by Kashinath Shastri, Motilal Banarasidas. Rasatarangini.11th edition. Delhi, 2009.
 16. Vishwanath Dwivedi. Rasendrasambhava Reprint 1997. Varanasi, Choukhambha Sanskrit Series Office,
 17. Shah Nagindas Chhanganlal, Bharat Bhaishyajya Ratnakar. First edition. New Delhi; B.Jain Publishers. 2005. Vol I –Vol V.
 18. Rasajalanidhi Mukherjee Bhoodeb. Rasajalanidhi. 4th edition. New Delhi; Chaukhambha Orientalia prakashana. 2004. Vol I –V.
 19. Bindu edited by Mishra Siddhinandan. Rasa paddhati. 2nd edition. Varanasi; Chaukhambha orientalia prakashan. 2005.
 20. Shalinath edited by Mishra Siddhinandan. Rasamanjiri. 1st edition. Varanasi; Chaukhambha orientalia prakashan.1995.
 21. Vaidya Lakshmipati Shastri, commentator, Bhisagratna Brahmashankara Shastri, editor, Anonymous, Yogaratnakara. Varanasi; Chaukhambha Prakkashana, Reprint 2010.
 22. Shri Bhav Mishra edited with hindi Vidyotini commentary by Shri Brahmashankar Mishra and Shri Rupalalaji Vaishya. Bhavprakash. 10th edition. Varanasi ; Choukhambha Sanskrit Sanstan ;2002.
 23. Lolimbaraja. Vaidyajeevana. 1st edition. Varanasi; Chaukhambha Sanskrit Series; 2010.
 24. Kalidas edited by Brahmashri Sharma and Jadavji Trikamji Acharya. Vaidyamanorama. 2nd edition. Borabaza street, Bombay, Choukhamba orientalia. 1924
 25. Shri Vallabhacharya translated with Hindi commentary by Dr. Ramnivas Sharma and Dr. Surendra Sharma. Vaidyachintamani. 1st edition. Delhi; Chaukhambha Sanskrit Prakashana, reprint 2013.
 26. Bhisagvara Vidyapati with Madhuri Hindi commentary by Indradeva Tripathi. Vaidyarahasya 1st edition Varanasi ; Choukhambha Sanskrit series, 2000.
 27. Shri Shaligramvaishyavarya (Anonymous) Shaligrama Nighantu Bhushana. Bruhat Nighantu Ratnakara. 1st edition. Khemaraja Shrikrishnadas Prakashana; Chaukhambha Sanskrit Prakashana, 1993. Part 7-8.
 28. Nagarjuna edited by Sharma H S. Rasendramangal.1st edition. Varanasi; Chaukhambha orientalia Prakashana; 2003.
 29. Zerrin Atakan. Cannabis, a complex plant: different compounds and different effects on individuals. *Ther Adv Psychopharmacol.* (2012); 2 (6) ;241–254.
 30. *Ayurvedic Pharmacopoeia of India* (API). Government of India, Ministry of Health and Family Welfare, Department of AYUSH. Vol. 5, appendix 5.
 31. Coutts AA et al. Localisation of cannabinoid CB (1) receptor immunoreactivity in the guinea pig and rat myenteric plexus. *J Comp Neurol.* 2002, Jul 8; 448 (4):410-22.
 32. [Cooper ZD](#). Adverse Effects of Synthetic Cannabinoids: Management of Acute Toxicity and Withdrawal, [Curr Psychiatry Rep.](#) May 2016;18 (5):52.
 33. Elsohly, M. (Grotenhermen, F. and Russo, E.eds.) Chemical constituents of Cannabis, in *Cannabis and cannabinoids Pharmacology, Toxicology and Therapeutic Potential*.2002. 27–36.
 34. Grotenhermen F. Pharmacology of cannabinoids. *Neuro Endocrinol Lett.* Feb-Apr (2004).25 (1-2):14-23.
 35. <http://www.niddk.nih.gov/health-information/health-topics/urologic-disease/erectile-dysfunction/Pages/facts.aspx>
 36. Rany Shamloul, Anthony J. Bella. Impact of Cannabis Use on Male Sexual Health. *The journal of sexual medicine*.2011, Vol 8 (4), 971-975.
 37. Opioid and cannabinoid receptors: friends with benefits or just close friends? *MacDonald British Journal of Pharmacology.* (2006) 148, 385–386 .
 38. M. Navarro et al. Functional Interaction between Opioid and Cannabinoid Receptors in Drug Self-Administration. *The Journal of Neuroscience*, July 15 2001, 21 (14):5344–5350.
 39. DI Abrams, Cannabinoid–opioid Interaction in Chronic Pain. *Nature publishing group articles advance online publication.* 2 November 2011. doi:10.1038/clpt.2011.188.
 40. Kulkarni Narla A, Brown DR. Localization of CB1-cannabinoid receptor immunoreactivity in the porcine enteric nervous system. *Cell Tissue Res.* Oct 2000; 302 (1):73-80.
 41. Coutts AA, Izzo AA. The gastrointestinal pharmacology of cannabinoids: an update. *Curr Opin Pharmacol.* Dec 2004;4 (6):572-9.
 42. Rabinarayan Acharya et al., *JDRAS*, (2015), Vol-1 (1), 1-12.
