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Research Article

PREPARATION AND MODIFICATION OF CHINNODBHAVADI KVATHA TO SYRUP AND QUALITY STANDARDISATION

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ABSTRACT

Swarasa (juice), Kalka (paste), Kvatha (decoction), Hima (cold infusion) and Phanta (hot infusion) are some of the traditional medicinal preparations prepared by ancient scholars of Ayurveda. Chinnodbhavadi kvatha is one of such formulations indicated for Amlapitta (gastric ulcer). Though Kvatha kalpana is pharmaceutically viable and therapeutically effective formulation, it has shorter shelf life. Chinnodbhavadi Kvatha has bitter and astringent which hampers the palatability. Sharkara kalpana (syrup) is widely acceptable dosage form due to its palatability, wide therapeutic applicability, longer shelf life, reduced dose and easy administration. Kvatha kalpana can be easily modified into syrup form, by adding sugar. Hence in the present study it was planned to modify the Kvatha into syrup and it was subjected to a comparative pharmaceutical and analytical studies through organoleptic and physico-chemical methods. The study showed that both medicines can be easily prepared and have similar analytical values which are comparable with limits of values as per API standards.

KEY WORDS: Amlapitta, Chinnodbhavadi kvatha, Kvatha kalpana, modification, Quality standards, Syrup

INTRODUCTION

Kvatha kalpana (KK) is considered as one of the basic Kalpana among Panchavidha Kashaya Kalpana (primary preparations) [1]. A detailed description about KK is present in all Samhita and in literatures of Ayurveda of medieval period[2]. Kvatha is the filtered decoction obtained by boiling coarse powder of drugs in proportion of four (Mridu), eight (Madhyama) or sixteen (Kathina) times of water and reduced to one-fourth[3].

Chinnodbhavadi Kvatha (CK) is a formulation, successfully being used in the treatment of Amlapitta (gastric ulcer)[4] owing easy availability of ingredients since ancient time. Amlapitta, a psychosomatic disorder affecting the gastro-intestinal system is more prevalent in the modern era as it is caused due to intake of improper diet and regimen[5]. The disease is characterized by the presence of symptoms such as Avipaka (indigestion), Utklesha (nausea), Tikta amla udgara (bitter and sour belching), Hrit kanta daha (heart and throat burn), Aruchi (anorexia), Sirashoola (head ache), and Angamarda (body ache)[6] etc which resembles the symptoms of gastric ulcer in modern science. Guduci[7] (*Tinospora cordifolia* (Willd.) Miers), Nimba[8] (*Azadirachta indica* A. Juss.), Patola[9] (*Trichosanthes dioica* Roxb.), Haritaki[7] (*Terminalia chebula* Retz), Vibhitaki[7] (*Terminalia belerica* (Gaertn) Roxb.) and Amalaki[7] (*Emblica officinalis* Gaertn) are the ingredients of this formulation. Studies have proved that the ingredients of this formulation have anti-ulcer[10], immunomodulatory[11], gastroprotective[12] and antioxidant activities[13]. Experimental study has proved the Amlapittahara (anti-ulcer) action of this formulation [14].

Sharkara (syrup) is a palatable liquid formulation which will be in consistency of honey with a higher shelf life compared to Kvatha[15]. The reference of Sharkara is available in the context of Sharkara sahita madya in ancient literatures of Ayurveda[16]. The explanation of Sharkara kalpana is mentioned in the recent books of Ayurveda[17] and a special type of preparation Sharbath mentioned in later periods of books [18, 19]. To any of the liquid preparation like Hima, Phanta, Arka, Kvatha etc. double quantity of sugar is added and boiled over mild fire until the liquid attains syrupy consistency[17]. Then it is filtered to get rid of any impurities present in sugar.

The CK has bitter and astringent which hampers the palatability. As Sharkara kalpana is widely acceptable dosage form due to its palatability, wide therapeutic applicability, longer shelf life, reduced dose and easy administration. Also KK can be easily modified into syrup form, by adding sugar. Hence in the present study it was planned to modify the Kvatha (CK) into Syrup (CS) and was subjected to a comparative pharmaceutical and analytical studies through organoleptic and physico-chemical methods.

MATERIALS AND METHODS

The methods followed in this work are divided into pharmaceutical study and analytical study. In the pharmaceutical study attempts were made to prepare the kvatha (CK) and Syrup (CS). In analytical study, parameters mentioned for assessment of Chinnodbhavdi kvatha churna (CKC), kvatha and syrup were carried out.

Plant Materials

The raw drugs stem bark of *Azadirachta indica* A. Juss, fruits of *Terminalia chebula* Retz, *Terminalia belerica* (Gaertn) Roxb. and *Emblica officinalis* Gaertn. were collected from Department of Rasashastra and Bhaishajya kalpana, Shri Dharmasthala Manjunatheshwara College of Ayurveda, Hassan, Stem of *Tinospora cordifolia* (Willd.) Miers, from the local area of Hassan and leaves *Trichosanthes dioica* Roxb. Was collected from CARe Keralam Ltd.,Thrissur, Kerala. The authentication of all the raw drugs was done at the Department of Dravya guna, Shri Dharmasthala Manjunatheshwara College of Ayurveda, Hassan based on macroscopic and organoleptic characters. The preparation of kvatha and syrup was done at the Department of Rasashastra and Bhaishajya kalpana, Shri Dharmasthala Manjunatheshwara College of Ayurveda, Hassan. .

Preparation of Chinnodbhavadi kvatha

Each ingredient of the CK was taken in quantity of 50 g in coarse powder (total 300 g) and eight parts of potable water (2400 ml) was added; boiled on low to medium heat in stainless steel vessel, on a LPG stove till the liquid portion was reduced to one fourth of the total quantity followed by filtration[3]. The total quantity of CK obtained was 630 ml.

Preparation of Chinnodbhavadi syrup

The total quantity of kvatha taken was 600 ml and the quantity of the sugar added was 1200 g (double part) [17]. After complete dissolving of sugar it was filtered and was reheated again until getting one thread consistency or honey consistency and stored in an air tight container. The total amount of CS obtained was 1250 ml.

Analytical study

Analytical evaluation of Chinnodbhavadi kvatha churna(CKC), CK and CS were carried out at SDM Research Centre for Ayurveda and Allied Sciences, Udupi. Samples were analyzed for organoleptic characters, pH, refractive index, specific gravity, total solids, reducing and non-reducing sugar, total sugar, and microbial contamination as per the references available in protocol for testing published by CCRAS[20].

HPTLC: For CKC, One gram of powdered samples were dissolved in 10 ml ethanol and kept for cold percolation for 24h and filtered and for CK & CS, 10 ml of Sample was partitioned with 20 ml of Butanol and the butanol layer was separated. 10 µl of the above samples of were applied on a pre-coated silica gel F254 on aluminum plates to a band width of 7 mm using Linomat 5 TLC applicator. The plate was developed in Toluene: Ethyl acetate:Acetic Acid:Water (3:2.5:0.8:0.2) using CAMAG (Muttenz, Switzerland) twin trough chamber. The developed plates were visualized in UV 254, 366, under white light at 540 nm and then derivatised with vanillin sulphuric acid reagent and scanned under UV 254 and 366 nm. R_f, colour of the spots and densitometric scan were recorded[21].

RESULTS

Kvatha churna especially Patola patra and Nimba were floating over surface of water upon addition to the vessel. The level was checked with the help of measuring scale. The boiling of the kvatha started after 43 minutes. When boiling started all the drugs were completely soaked and mixed in the water. Mild white frothing was seen while boiling the color of the boiling CKC was dark brown. The smell of the Haritaki and Amalaki was predominant in while boiling. At the completion of process, the color of the kvatha was dark brown with thicker consistency.

Soon after addition of sugar, colour of CKC turned to light. The time taken to get one thread consistency was 25 min and the average temperature was 61^0C. The total amount of syrup obtained was 1250 ml. The color of the syrup was brown and had smell of honey. The liquid was more viscous & sticky to touch (Table 1).

Analytical study provides the objective parameters to fix up the standards for quality of raw drugs, in process as well as finished products. This will generally help and develop parameters by means of which the batch quality can be maintained. In the present study, analytical evaluation of CKC, CK and CS was carried out to develop preliminary standards (Table 2-5, Figure 1). Total microbial count in the Chinnodbhavadi Kvatha and Syrup was found to be nil (Table 6)

HPTLC finger print profile of ethanol extract of CKC, Butanol layer extract of CK and CS has been obtained with suitable solvent system. The developed plates were visualized under UV 254, 366, under white light at 540 nm and then after derivatisation with vanillin sulphuric acid reagent. R_f, colour of the spots and densitometric scan at 254 and 366 nm were recorded. On photo documentation there were 4 spots in CKC, 3 spots in CK, 3 spots in CS under short UV; 14 spots in CKC, 9 spots in CK, 8 spots in CS under long UV and 12 spots in CKC, 7 spots in CK, 5 spots in CS under white light post derivatisation.

Densitometric scan at 254 nm showed 7 peaks in CKC, 5 peaks in CK and 6 peaks in CS. Among them peaks with R_f 0.21and 0.94 were common in all the three samples with different percentage R_f 0.21=17.99% (CKC), 27.37% (CK), 15.58% (CS); R_f 0.94= 6.55% (CKC), 3.76% (CK), 4.25% (CS), R_f 0.60 common in both CKC (63.98%) and CK (64.25%), R_f 0.78 and R_f 0.04 are common for both CK and CS. R_f 0.78=1.99% (CK), 0.95% (CS); R_f 0.04= 2.64% (CK), 1.79% (CS) , other peaks are in CKC at R_f 0.03 (2.05%), 0.33 (7.73%), 0.75 (1.24%) and 0.83 (0.45%) and in CS at R_f 0.59 (76.25%), 0.79 (1.19%) (Table 7 and Figure 2).

Densitometric scan at 366 nm showed 6 peaks in CKC, 4 peaks in CK and 4 peaks in CS. Among them R_f 0.21 is common for both CKC (47.85%) and CS (36.72%). Other peaks are in CKC at R_f 0.02 (2.82%), 0.37 (3.44%), 0.61 (31.60), 0.75 (2.48%), 0.93 (11.81%), in CK at R_f 0.22 (50.23%), 0.60 (41.49%), 0.78 (3.58%), 0.92 (4.70%) and in CS at R_f 0.58 (54.05%), 0.77 (4.05%) and 0.94 (5.18%) (Table 8 and Figure 3).

Densitometric scan at 540 nm showed 5 peaks in CKC, 3 peaks in CK and 5 peaks in CS. Among them R_f 0.21is common for both CKC (26.66%) and CK (25.10%), R_f 0.60 is common for CKC (40.59%), CK (55.36%) and CS (27.47%). Other peaks are in CKC at R_f 0.02 (9.14%), 0.24 (19.05%), 0.94 (4.56%), in CK at R_f 0.25 (19.54%) and CS at R_f 0.13 (6.17%), 0.22 (16.61%), 0.49 (11.84%), 0.58 (37.91%) (Table 9 and Figure 4-5).

Table 1: Organoleptic characters

Parameter	Kvatha	Syrup
Colour	Dark brown	Brown
Appearance	Free flowing Liquid	Viscous Liquid
Odor	Triphala smell	honey smell
Taste	Tikta –kashaya-amla	Madhura –tikta-kashaya

Table 2: physicochemical parameters

Parameter	Results n = 3 %w/w	
	Kvatha	Syrup
pH	2.5	3
Refractive Index	1.34717	1.46867
Specific Gravity	1.0132	1.3564
Total Solids	6.635	28.462
Reducing Sugar	-	5.655
Non Reducing Sugar	-	55.845
Total Sugar	-	61.5

Table 3: R_f values of the samples At 254 nm (At 10 µl)

CKC	CK	CS
0.20(L Green)	0.20(L Green)	0.20(L Green)
0.31(L Green)	0.31(L Green)	-
0.54(D Green)	0.54(Green)	0.54(Green)
0.81(L Green)	-	0.81(L Green)

Table 4: R_f values of the samples At 366 nm (At 10 µl)

CKC	CK	CS
0.07(F L Violet)	0.07(F L Violet)	0.07(F L Violet)
0.16(F L Green)	-	-
0.19(F L Green)	0.19(F L Green)	0.19(F L Violet)
0.32(F L Violet)	-	0.32(F L Violet)
0.42(F L Violet)	0.42(F L Green)	-
0.46(F L Violet)	-	-
0.54(F L Violet)	0.54(F L Violet)	0.54(F L Violet)
0.58(F L Violet)	0.58(F L Green)	0.58(F L Violet)
-	0.61(F L Green)	-
0.64(F L Violet)	-	-
-	0.67(F L Violet)	-
0.72(F L Violet)	-	0.72(F L Violet)
0.79(F L Violet)	-	-
-	0.82(F L Violet)	0.82(F L Violet)
0.84(F L Pink)	-	-
-	0.87(F L Violet)	0.87(F L Violet)
0.90(F Green)	-	-
0.98(F Pink)	-	-

Table 5: R_f values of the samples After derivatisation (At 10 µl)

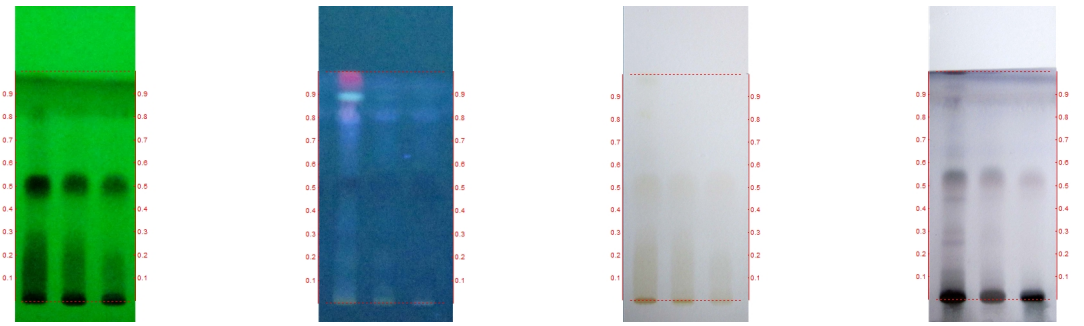
CHURNA	KVATHA	SYRUP
0.08(L Violet)	0.08(L Violet)	0.08(L Violet)
0.13(L Violet)	0.13(L Violet)	0.13(L Violet)
0.18(L Violet)	-	-
-	0.21(L Violet)	-
0.25(Violet)	-	0.25(L Violet)
-	0.28(L Violet)	-
0.30(L Violet)	-	-
0.34(L Violet)	-	-
0.44(Violet)	0.44(L Violet)	-
0.56(D Violet)	0.56(L Violet)	0.56(L Violet)
0.63(L Violet)	-	-
0.68(L Violet)	-	-
0.77(L Violet)	-	-
0.87(Violet)	0.87(L Violet)	0.87(L Violet)

*F-Fluorescence, L-Light, D-Dark

Table 6: Total bacterial count of Chinnodbhavadi Kvatha sample

Parameter	Sample Name	Number Of Colonies (NOC)			CFU/ml
Bacterial count	Chinnodbhavadi Kvatha	0	0	0	0
	Chinnodbhavadi Syrup	0	0	0	0
Fungal count	Chinnodbhavadi Kvatha	0	0	0	0
	Chinnodbhavadi Syrup	0	0	0	0

CFU – Colony forming unit



At 254 nm **At 366 nm** **At 540 nm** **After Derivatisation**

Track 1- Chinnodbhavadi Churna– 10 µl, Track 2- Chinnodbhavadi Kvatha– 10 µl
Track 3- Chinnodbhavadi Syrup– 10 µl, Solvent system: Toluene: Ethyl Acetate: Acetic Acid: Water (3.0:2.5:0.8:0.2)

Figure 1: HPTLC photo documentation of Butanol extract of Chinnodbhavadi Kvatha Choorna (CKC), Chinnodbhavadi Kvatha (CK) and Chinnodbhavadi Syrup (CS)

Figure 2. Densitometric scan of the sample At 254 nm (At 10 µl)

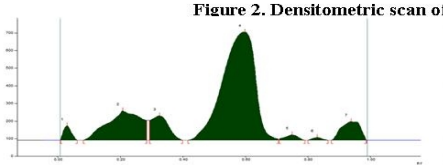


Fig 2.a CKC

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.01 Rf	5.8 AU	0.03 Rf	82.4 AU	7.15 %	0.06 Rf	0.1 AU	1470.7 AU	2.05 %
2	0.08 Rf	0.0 AU	0.21 Rf	166.4 AU	14.45 %	0.29 Rf	12.0 AU	12909.2 AU	17.99 %
3	0.29 Rf	112.0 AU	0.33 Rf	138.1 AU	11.99 %	0.40 Rf	0.2 AU	5542.9 AU	7.73 %
4	0.42 Rf	0.1 AU	0.60 Rf	613.8 AU	53.31 %	0.71 Rf	6.4 AU	45901.6 AU	63.98 %
5	0.71 Rf	6.7 AU	0.75 Rf	30.5 AU	2.65 %	0.79 Rf	0.0 AU	891.8 AU	1.24 %
6	0.80 Rf	0.1 AU	0.83 Rf	15.4 AU	1.34 %	0.86 Rf	0.1 AU	325.6 AU	0.45 %
7	0.88 Rf	0.2 AU	0.94 Rf	104.8 AU	9.10 %	0.99 Rf	4.1 AU	4702.1 AU	6.55 %

Table 7.a CKC

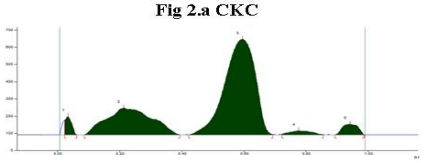


Fig 2.b CK

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.02 Rf	85.5 AU	0.04 Rf	106.3 AU	11.77 %	0.06 Rf	0.2 AU	1611.7 AU	2.64 %
2	0.09 Rf	0.1 AU	0.21 Rf	156.4 AU	17.32 %	0.40 Rf	0.1 AU	16696.6 AU	27.37 %
3	0.42 Rf	0.2 AU	0.60 Rf	554.9 AU	61.47 %	0.69 Rf	1.9 AU	39198.5 AU	64.25 %
4	0.72 Rf	4.3 AU	0.78 Rf	23.6 AU	2.62 %	0.86 Rf	1.6 AU	1213.4 AU	1.99 %
5	0.89 Rf	0.1 AU	0.94 Rf	61.6 AU	6.83 %	0.99 Rf	1.5 AU	2292.1 AU	3.76 %

Table 7.b CK

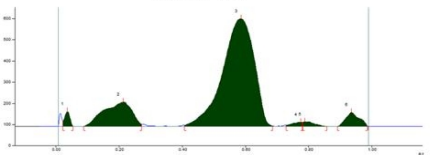


Fig 2.c CS

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.02 Rf	25.1 AU	0.04 Rf	69.3 AU	8.66 %	0.05 Rf	0.9 AU	856.8 AU	1.79 %
2	0.09 Rf	0.1 AU	0.21 Rf	115.2 AU	14.39 %	0.27 Rf	10.5 AU	7475.8 AU	15.58 %
3	0.41 Rf	5.1 AU	0.59 Rf	508.3 AU	63.52 %	0.69 Rf	1.9 AU	36596.5 AU	76.25 %
4	0.73 Rf	5.9 AU	0.78 Rf	19.6 AU	2.45 %	0.78 Rf	18.5 AU	458.0 AU	0.95 %
5	0.78 Rf	18.8 AU	0.79 Rf	21.5 AU	2.69 %	0.86 Rf	0.2 AU	570.9 AU	1.19 %
6	0.89 Rf	0.0 AU	0.94 Rf	66.4 AU	8.29 %	0.99 Rf	2.4 AU	2038.3 AU	4.25 %

Table 7.c CS

Figure 3. Densitometric scan of the sample At 366 nm (At 10 µl)

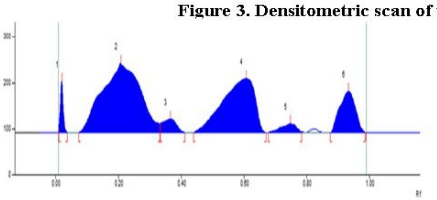


Fig 3.a CKC

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.01 Rf	9.6 AU	0.02 Rf	111.2 AU	21.51 %	0.04 Rf	0.5 AU	768.9 AU	2.82 %
2	0.07 Rf	0.4 AU	0.21 Rf	149.9 AU	28.98 %	0.33 Rf	20.2 AU	13067.7 AU	47.85 %
3	0.33 Rf	20.3 AU	0.37 Rf	30.2 AU	5.83 %	0.41 Rf	0.1 AU	940.5 AU	3.44 %
4	0.44 Rf	0.1 AU	0.61 Rf	116.5 AU	22.54 %	0.67 Rf	0.0 AU	8630.2 AU	31.60 %
5	0.68 Rf	0.5 AU	0.75 Rf	20.1 AU	3.89 %	0.79 Rf	1.0 AU	676.7 AU	2.48 %
6	0.88 Rf	0.2 AU	0.93 Rf	89.2 AU	17.25 %	0.99 Rf	0.6 AU	3225.5 AU	11.81 %

Table 8.a CKC

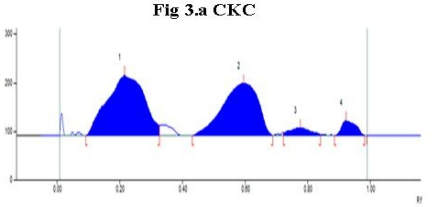


Fig 3.b CK

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.09 Rf	0.0 AU	0.22 Rf	123.7 AU	44.72 %	0.33 Rf	21.5 AU	10571.9 AU	50.23 %
2	0.43 Rf	0.1 AU	0.60 Rf	107.0 AU	38.69 %	0.69 Rf	0.1 AU	8733.9 AU	41.49 %
3	0.72 Rf	5.0 AU	0.78 Rf	15.6 AU	5.65 %	0.84 Rf	1.9 AU	752.5 AU	3.58 %
4	0.89 Rf	0.0 AU	0.92 Rf	30.3 AU	10.94 %	0.98 Rf	0.0 AU	989.8 AU	4.70 %

Table 8.b CK

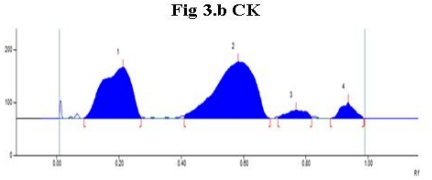


Fig 3.c CS

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.09 Rf	1.2 AU	0.21 Rf	96.7 AU	38.82 %	0.27 Rf	2.3 AU	6544.7 AU	36.72 %
2	0.41 Rf	4.9 AU	0.58 Rf	106.8 AU	42.88 %	0.69 Rf	0.2 AU	9632.0 AU	54.05 %
3	0.71 Rf	3.1 AU	0.77 Rf	15.2 AU	6.11 %	0.82 Rf	3.3 AU	721.9 AU	4.05 %
4	0.88 Rf	0.1 AU	0.94 Rf	30.4 AU	12.19 %	0.99 Rf	0.4 AU	923.1 AU	5.18 %

Table 8.c CS

Figure 4. Densitometric scan of the sample At 540 nm (At 10 µl)

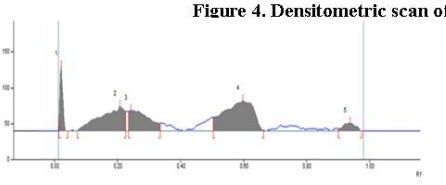


Fig 4.a CKC

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.01 Rf	14.3 AU	0.02 Rf	89.3 AU	43.75 %	0.04 Rf	0.0 AU	634.0 AU	9.14 %
2	0.07 Rf	0.0 AU	0.21 Rf	33.9 AU	16.60 %	0.23 Rf	27.4 AU	1848.7 AU	26.66 %
3	0.24 Rf	27.5 AU	0.24 Rf	28.4 AU	13.93 %	0.34 Rf	10.6 AU	1320.7 AU	19.05 %
4	0.50 Rf	19.0 AU	0.60 Rf	41.6 AU	20.38 %	0.66 Rf	0.7 AU	2814.5 AU	40.59 %
5	0.90 Rf	2.9 AU	0.94 Rf	10.9 AU	5.35 %	0.98 Rf	0.2 AU	316.5 AU	4.56 %

Table 9.a CKC

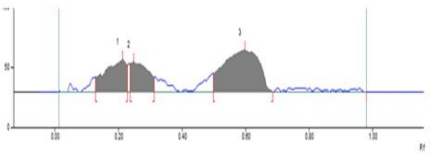


Fig 4.b CK

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.13 Rf	12.1 AU	0.21 Rf	27.1 AU	31.25 %	0.23 Rf	22.7 AU	1269.0 AU	25.10 %
2	0.24 Rf	23.6 AU	0.25 Rf	24.8 AU	28.59 %	0.31 Rf	12.7 AU	987.8 AU	19.54 %
3	0.50 Rf	15.4 AU	0.60 Rf	34.8 AU	40.16 %	0.69 Rf	0.2 AU	2798.9 AU	55.36 %

Table 9.b CK

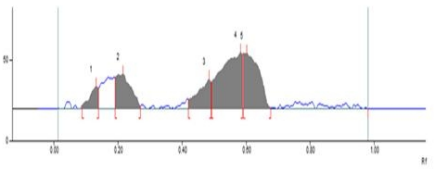
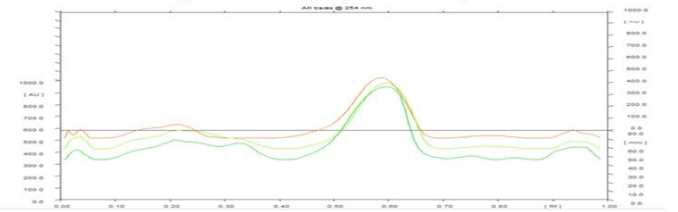


Fig 4.c CS

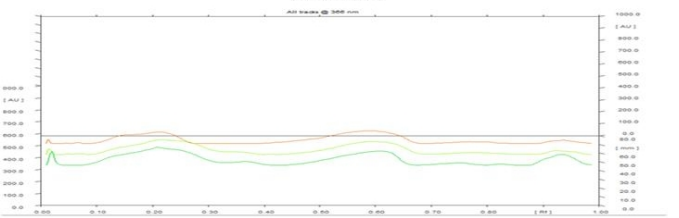
Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.09 Rf	2.0 AU	0.13 Rf	13.5 AU	11.16 %	0.14 Rf	12.6 AU	268.9 AU	6.17 %
2	0.19 Rf	19.1 AU	0.22 Rf	21.2 AU	17.46 %	0.27 Rf	1.6 AU	723.8 AU	16.61 %
3	0.42 Rf	5.7 AU	0.49 Rf	18.1 AU	14.90 %	0.49 Rf	16.4 AU	515.7 AU	11.84 %
4	0.49 Rf	16.6 AU	0.58 Rf	34.4 AU	28.34 %	0.59 Rf	33.4 AU	1652.0 AU	37.91 %
5	0.59 Rf	33.6 AU	0.60 Rf	34.1 AU	28.14 %	0.68 Rf	0.4 AU	1197.1 AU	27.47 %

Table 9.c CS

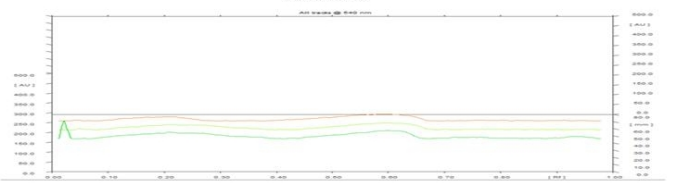
Figure 5. 3-D Display of all the samples



At 254 nm



At 366 nm



At 540 nm

DISCUSSION

CK is mentioned in Bhaishajya Ratnavali for the treatment of Amlapitta. The bitter and astringent taste of the formulation and low shelf life made this formulation difficult to use in clinical practice. Modification into syrup was attempted with the aim of enhancing palatability, shelf life, patient compliance and reduces dosage. Drugs are similar in both preparations, except addition of sugar into syrup. The crushing of the drugs into coarse powder form increases the surface area and helps in complete dissociation of active principles into water. As the ingredients of CK is combination of Mridu (soft), Madhyama (medium) and Kathina (hard) nature, Madhyama was taken into consideration, and hence eight parts of water was added and reduced to one fourth. The odor of the Haritaki, Amalaki and Patola patra was felt during boiling process which is mostly due to the presence of low boiling constituents present in it. Mild white frothing was seen while boiling which may be due to the presence of wet drug Guduci. Mild heat was applied for proper extraction of active constituents and boiling helps for easy penetration of water soluble principles into water, vaporization of heat soluble principles and destruction of micro organisms. During the preparation the temperature was maintained from 30-96^{o}C.

Double quantity sugar was added to the prepared CK, which helps to prevent the microbial growth and provides palatability

to the preparation. Mandagni (mild fire) should be followed until the liquid attains one thread consistency, which provides the honey consistency to the Syrup. Filtering after complete dissolution of sugar particles help to remove the physical impurities. The syrup had smell of honey and the taste changed to Madhura-Tikta-Kashaya due to the presence of sugar.

The influence of sugar was significant in all the organoleptic characters of syrup. The colour changed from dark brown to brown, free flowing liquid nature of kvatha turns to viscous nature, characteristic Haritaki, Amalaki and Patola smell was changed to aromatic honey smell and the taste was changed from Tikta (bitter) - Kashaya (astringent) – Amla (sour) to Madhura (sweet) - Tikta (bitter) - Kashaya (astringent) as the properties of sugar was imbibed into the Kvatha and brought these changes.

The pH of any liquid provides the quantitative indication of the acidity or alkanity of a solution. The pH of Kvatha was 2.5 and syrup was 3 indicating the acidic nature of both samples. Absorption, efficacy and irritability of a medicine will depend on the pH value also. Presence of sugar is important in reducing the acidity of syrup.

Refractive index of Kvatha is 1.34717 and syrup is 1.46867. Refractive index of a substance is defined as the ratio of the velocity of light in vaccum or air, to that in the substance. It is directly proportional to density (consistency of the media and solutes present in the media). Increase of refractive index in syrup is due to the addition of sugar particles which increase the density of syrup.

Specific gravity of Chinnodbhavadi Kvatha is 1.0132 and syrup is 1.3564. Specific gravity is defined as the weight of a given volume of the liquid at the stated temperature as compared with the weight of an equal volume of water at the same temperature. Increase of specific gravity in syrup is due to the presence of sugar particles in syrup. Specific gravity of simple syrup is not less than 1.30[150]; here the specific gravity of Chinnodbhavadi syrup is equal to the referred value, which suggests that the quality of prepared syrup is within normal limits.

Total solid substance (TSS) of the Kvatha is 6.635 and syrup is 28.462. The Total solids are the measure of the combined content of all inorganic and organic substances contained in a liquid. The soluble content determines the amount of constituents in a given sample of drug. The presence of sugar particles in the syrup cause significant increase of TSS in syrup.

Reducing sugar of syrup is 5.655. Sugars that undergo reduction reaction or oxidizes is called reducing sugar. Sugar group having aldehyde (aldose) or ketone (ketose) is considered as reducing sugars.

Non Reducing Sugar of syrup is 55.845. Sugars which do not undergo reduction reaction i.e. sugars which do not contain aldehyde and ketone group.

Total bacterial count and total fungal count in the sample of CK was nil. It shows that the medicine was prepared in aseptic condition and the Kvatha was freshly prepared one and stored in sterilized bottle. Total bacterial count and total fungal count in the sample of CS was nil. This proves the self preservative action sugar in the Syrup. High osmotic pressure in Syrups prevents the growth of bacteria, fungi and moulds, thus preventing decomposition.

HPTLC photo documentation revealed presence of phyto constituents with different R_f values. Densitometric scan of the plates showed diagnostic bands under 254 nm, 366 nm and post derivatisation. All the samples have shown almost very similar HPTLC pattern with similar peaks .Additional peaks found in *Churna* suggest of volatile components present in the drugs which are evaporated during heating of *Kvatha*. Peaks common in *Churna* and *Kvatha* & not present in syrup suggest the active principles which are evaporated due to repeated heating. Peaks present in *Kvatha* and syrup and not seen in churna may be imbibed from the water media and the Peaks present only in *Kvatha* may be imbibed from water but later evaporated during repeated heating. HPTLC study indicates that modified syrup has almost all the active components of kvatha and kvatha churna. HPTLC fingerprinting is an effective technique of screening herbal raw drugs for authenticity and quality[22, 23].

CONCLUSION

This study on pharmaceutico analytical evaluation of Chinnodbhavadi Kvatha and syrup could conclude as follows: genuine raw materials of study formulations are easily and abundantly available. All the six drugs of Chinnodbhavadi Kvatha individually possess anti-ulcer activity. The drugs in the study predominantly have Tikta, Kashaya rasa; Laghu, Ruksha guna; Ushna virya and Madhura vipaka which help in the anti-ulcer action of the formulation. There is no pharmaceutical constraint in preparation of Kvatha or syrup. Analytical studies including HPTLC have helped to generate preliminary standards for both Kvatha and syrup. The comparative analysis of the values with other available analytical values suggests that the formulation is within the limit of standard parameters. This suggests that the preparation was done in an authenticated manner.

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REFERENCES

1. Sastri Parasurama, Vidyasagar. Sarangadhara Samhita. 5th ed. Varanasi: Chaukhambha Orientalia,Madhyama Khanda, Swarasadhyaya, Shloka 01; 2002. p.137
2. Sastri Parasurama, Vidyasagar. Sarangadhara Samhita. 5th ed. Varanasi: Chaukhambha Orientalia, Madhyama Khanda, Swarasadhyaya; 2002. p.144-47
3. The Ayurvedic formulary of India. 2nd ed. New Delhi: The Controller of Publication, Part 1,Paribhasha; 2003.p.353
4. Sastri Ambikadatta. Bhaishajya Ratnavali. 14th ed. Varanasi: Chaukhambha Sanskrit Sansthan, Amlapittachikitsa prakaranam,Shloka.17; 2001.p.643
5. Gouri C, Arun KM, Kaboor AB, Abhimanyu K. Study on clinical efficacy of Aviattikar churna and Sutasekhara rasa in the management of Urdhwaga Amlapittta. J Pharm Sci Innov. 2015; 4(1): 11-15 htpp://dx.doi.org/10.7897/2277-4572.0414
6. Vijayarakshita, Datta S. Madhava Nidana. Reprint. Varanasi: Chaukamba Surabharati Prakashan, 2003.p.228-29
7. The Ayurvedic Pharmacopeia of India. Reprinted. New Delhi: The Controller of Publications Civil Lines Part 1.Vol 1; 2001.p.41,47, 26,4

8. The Ayurvedic Pharmacopeia of India. 1st ed. New Delhi: The Controller of Publications Civil Lines, Part 1.Vol 5; 2006 .p.119-20
9. Sharma PC, Yelne MB, Dennis TJ. Databaes on Medicinal Plants Used in Ayurveda and Siddha. New Delhi: CCRAS, Vol 5; 2008.p.269-70
10. Kamali Seyed Hamid, Reza KA, Hasani SR, Esphenani MM, ohammad K, arijani B. A Systematic Review of the anti-oxidant, anti-diabetic and anti-obesity effects and safety of Triphala Herbal Formulation. Journal of Medicinal Plant Research. 2013: 7(14); 831-44 http://emri.tums.ac.ir/upfiles/170606917.pdf
11. Chandan N.G,Tirthankar Deb, S. Manju Bhargavi. Evaluation of Anti-ulcer activity of Tinosporia cordifolia in Albino rats. Int J Pharm Bio Sci. 2013;4(2):78-85 file:///C:/Users/dl27/Downloads/2104_pdf%20(1).pdf
12. Tomar Lokeshwar, Sharma Pankaj, Bachwani Mukesh, Bansal Vishnu .Review on Neem (Azadirachta indica): Thousand problems one solution. Int. Res. J. Pharm. 2011; 2(12): 97-102
13. Nitin Kumar. Trichosanthes dioica Roxb: An Overview. International Journal of Pharma and Bio Sciences. 2011: 2(3);111-18 http://ijpbs.net/vol-2_issue-3/pharma_science/15.pdf
14. Nariya M Kumar, Tomar R, Shukla V, Ravishankar B, Jain S. The inhibition of gastric mucosal injury by Chinnodbhavadi kwath (decoction) – an Indian Ayurvedic formulation in rats. J Exp Integr Med. 2013: 3 (3); 243-47 http://www.scopemed.org/?jft=4&ft=4-1359605828
15. K Ramachandra Reddy. Bhaishajya Kalpana Vijnana. 1st ed. Varanasi: Chaukhambha Sanskrit Bhavan; 1998. p. 197
16. Acharya YT. Charaka Samhita. 4th ed. Varanasi: Chaukhambha Sanskrit Sansthan, Sutrasthana, Saptavimsato adhyaya, Shloka .183; 1994. p.162
17. Acharya YT. Dravya Guna Vijnanam. 2nd ed. Bombay: Satyabhamabai Pandurang, Uttarardha, Pradhama Paribhasha Khanda, Sholoka .56; 2003. p.40-41
18. Ayurveda Sara Sangraha. 1st ed. New Delhi: Sri Baidyanath Ayurveda Bhavan Limited, Sharbath Prakarana; 2002.p.567-68
19. Bhatta R.K. Sidddhabheshaja Manimala. 2nd ed. Varanasi: Krishnadas Accademy; 1999.p.154
20. Lavekar G S, Padhi M M, Pant Pramila, Sharma M M, Verma Chandra Subash, Singh Arjun et al. Laboratory Guide for Analysis of Ayurveda and Siddha Formulations. New Delhi: CCRAS; 2010. P.31,33,42, 53, 74, 103
21. Sethi PD. High Performance Thin Layer Chromatography.1st ed., New Delhi: CBS Publishers and Distributors; 1996; p. 1-56
22. Saraswathy A, Shakila R, Sunil Kumar KN. HPTLC Fingerprint profile of some *Cinnamomum* species. Phcog J 2009: 8; 211-5.
23. KN Sunil Kumar, B Sangeetha, M Rajalekshmi, B Ravishankar, R Muralidhar, B Yashovarma. Pharmacognostical and Preliminary phytochemical studies on dyer's oleander mistletoe- Viscum orientale Willd. Indian Journal of Natural Products & Resources 2013:4 (3); 260-69

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