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PHARMACEUTICO-ANALYTICAL STANDARDIZATION OF *BALCHATUR BHADRA SYRUP PREPARED FROM HIMA, PHANTA, KWATHA AND ARKA*

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ABSTRACT *Balchaturbhadra churna* is one of the most effective and preferred traditional formulation to treat common cold, cough, fever, diarrhea, vomiting in pediatrics but many times rejected due to its *Churna* form and bitter taste. Most encountered challenges with *Churna* dosage form are about its palatability, unmasked test of ingredient shelf life and stability. Modern pharmaceutics offers many dosage forms which improve above stated challenges. Liquid dosage form is particularly preferred for children and elder patients, as it is easy to consume, palatable and more acceptable by children. In *Sarkara Kalpana*, there is a reference for liquid preparations like *Hima, Phanta, Kwatha* and *Arka* etc. by double the quantity of sugar is added and boiled over very mild fire until the liquid attains syrup consistency. The present study was undertaken to develop standard *Balchaturbhadra* syrup using liquid media as *Hima, Phanta, Kwatha* and *Arka.* The present study shows that there is a difference, by analytical parameters viscosity, total solid content is high in *Kwatha* syrup, in comparative HPTLC same active principles are shown in *Kwatha, Hima* and *Phanta* syrup and in microbial analysis *Kwatha, Phanta* and *Arka* syrup are not infected by any microbes.

KEYWORDS : *Balchaturbhadra Churna*, Syrup, *Hima, Phanta, Kwatha, Arka*

INTRODUCTION

Ayurveda, the Indian traditional system of medicine has been curing the ailments of living being since ages. Traditional medicines are great in demand in the developed as well as developing countries for primary healthcare because of their wide biological activities, higher safety margins and lesser cost.[1] *Ayurvedic* formulations can be classified in different categories like solid, semisolid, liquid. *Balchaturhadra Churna* is one of the most commonly practiced formulations. It is very safe and effective remedy to overcome diseases like fever, cough, cold, diarrhea and vomiting of children.[2] It boosts immunity to protect the child from minor infections.

Ativisha- Tikta, Katu rasa, Laghu and *Ruksha guna, Usna virya* and *Katu vipaka.* It is *Deepaka* (increase digestive fire), *Pachana* (digest undigested material), *Graahi* (prevent water loss from body), *Sothahara* (anti-inflammatory), *Jwarhara* (antipyretic), *Kasahara* (antitussive) and *Atisaragna* (antidiarrheal).[3]

Musta – Tikta, Katu, Kashaya rasa, Laghu and *Ruksha guna, Sheeta virya* and *Katu vipaka*. It is *Deepaka* (increase digestive fire), *Pachana* (digest undigested material), *Graahi* (prevent body water loss), *Jwarhara* (antipyretic), *Atisarghna* (antidiarrheal) and *Kanduhara* (anti-itching).[3]

Pippali – Katu rasa, Laghu, Snigdha and *Tikshna guna, Anushna sheeta virya* and *Madhur vipaka*, *Kasahara* (antitussive), *Shwasahara* (anti asthmatic activity), *Jwaraghna* (antipyretic), immunomodulatory activity and anti-amoebic activity.[4]

Karkatshringi – Kashaya, Tikta rasa, Laghu and *Ruksha guna, Ushna virya* and *Katu vipaka.* It is used for the treatment of asthma, chronic bronchitis, diarrhea, fever, antispasmodic, antiamoebic and antihelminthic.[5]

Balchaturbhadra Churna has to be consumed with *Kshaudra* (*Madhu*). The preparation of *Churna* is quite simple but it won't be convenient for pediatric cases due to its bitter taste. So in present scenario, it is needed to be converted to a new dosage form which is palatable and suitable form for pediatrics use. The most appropriate dosage form for pediatrics is liquid form and it is absorbed faster than solid form.

In the 20thcenturyYadavaji Trikamji introduced *Sarkara* preparations into *Ayurvedic* pharmaceutics as a vehicle for the administration of nauseous drugs as the drug's undesirable odor and taste are completely masked.[6]There is no known research work carried out on modification of traditional formulation *Churna* to *Sarkara Kalpna* liquid preparation like *Hima, Phanta, Kwatha* and *Arka*.

In *Sarkara Kalpana*, for any of mentioned liquid preparation, double the quantity of sugar is added and boiled over very mild fire until the liquid attains syrup consistency.[6] Present study attempt to develop various liquid form (syrup) of *Balchaturbhadra* and standardize the finished products to find the role of different media (base *Kalpana*).

MATERIALS AND METHODS:

The ingredients of preparation *Ativisha* and *Pippali* were procured from Saraiya Nathalal and sons local market of Vadodara. *Musta*, *Karkatshringi* and *Sarkara* were procured from G. Y. Hakim, the local market of Vadodara. The preservative sodium benzoate was procured from the pharmacy department, Parul Institute of Ayurved. All raw materials were authenticated by Dept. of Dravyagunavijnana, Parul Institute of Ayurved, PU. Pharmaceutical preparation of *Balchaturbhadra* syrup was done in GMP certified Ayurved Pharmacy, Parul institute of Ayurved.

Preparation of Balchaturbhadra Syrup:

Balchaturbhadra syrup was prepared by four different methods by using base media as *Hima, Phanta, Kwatha* and *Arka.* All syrup was prepared in triplicate batches.

Kwatha

200 gm drug was taken in a steel vessel and soaked with water for overnight. Next day it was heated in *Mandagni* with continuous stirring without covering its mouth. Water has been evaporated slowly and reduced until the quantity become 1/8th part of water taken, stop the heating process allowed to cool it. Then, it was filtered through double folded cotton cloth to get clear *Kwatha.*[7]

Hima

100 gm drug was taken into a stainless steel pan and 6 times of cold water was added. Then it was kept overnight by closing a lid. Next day morning contents were rubbed with hands and filtered with a clean cloth. Thus obtained *Balchaturbhadrahima* is weighed and kept in a vessel for further preparation.[8]

Phanta

150 gm drug was taken in equal quantity in coarse powder form and added 4 times hot water in it. Soaked the drug until the warm water becomes lukewarm and macerated well, filtered through a clean cloth. The filtrate is taken as *Phanta*. [9]

Arka

100 gm drug was collectedin coarsely powder form then some quantity

of water was added to the drugs for soaking and kept overnight. The following morning it was transferred into distillation apparatus with condenser attach to it and the remaining water was added and closed properly.The apparatus was heated to 80°c and the temperature was maintained. After 40 minutes *Arka* started draining out of the receiver.First 7 to 10 drops were not collected. *Arka* was collected up to 1/3 amount of water then further heating was stopped. The collected *Arka* was stored in an air tight glass bottle.[10]

Balchaturbhadra Kwatha, Hima, Phanta and *Arka* was taken in required quantity and 800gms *Sarkara*was dissolved in it. This total mixture of liquid was again heated with *Mandagn*i till it attains proper *Paka*. After attaining proper *Paka* contents were filtered in a hot state through a clean cotton cloth. As it became cool, Sodium benzoate was added in the ratio of 0.2% and it was properly mixed. Again it was filtered through a clean cloth and it was filled in the container.[6]

Table no.1: Ingredients of *Balchaturbhadra Churna*

Sr. No	Name of Drug	Latin/English Name	Initial proportion
1	*Ativisha*	*Aconitum Heterophyllum wall*	1 part
2	*Pippali*	*Piper Longum Linn*	1 part
3	*Musta*	*Cyperus Rotundus Linn*	1 part
4	*Karkatshringi*	*Pistacia Integerrima Stew*	1 part

Table no.2: *Balchaturbhadra* syrup prepared by using different media as *Balchaturbhadra Kwatha, Hima, Phanta and Arka*

Parameters	Kwatha syrup	Hima syrup	Phanta syrup	Arka syrup
Quantity of drug	200 gm	100 gm	150 gm	100 gm
Quantity of water	3200 ml	600 ml	600 ml	1000 ml
Soaking of the drugs	15 hours	15 hours	-	15 hours
Quantity of obtained	406 ± 4 Ml	449.33 ± 3. Ml	444.33 ± 4.163 ml	330 Ml
Temperature during process	80-95°c	-	-	80°C
Time duration for preparation	1.51 hours	-	-	4 hours
Quantity of taken	400 ml	400 ml	400 ml	330 ml
Quantity of *Sarkara* added	800 gm	800 gm	800 gm	660 gm
Temperature during process	80-95°c	80-95°c	80-95°c	80-95°c
Final quantity of syrup	1172 ± 9.073 Ml	1040.66 ± 6.027 ml	1010 ± 4 ml	849.66 ± 3.511 Ml
Time duration for *Paka*	47.66 ± 2.516 minutes	58.66 ± 3.055 minutes	51.66 ± 2.516 minutes	62.33 ± 2.516 minutes

ANALYTICAL STUDY:

An *Ayurvedic* preparation involves multiple herbs and multi-step complex procedures making it difficult for standardization and quality control of the finished product. Quality raw material is also concrete requirement for high grade finished product, hence the qualitative and quantitative study of the particular formulation should be carried out by the use of various parameters which helps in standardization and authentication of the raw material as well finished product.

Raw Drug analysis:

Analysis of raw drug was carried out at quality control lab of Parul Institute of Ayurved as per API standards. Parameters such as foreign matter, loss on drying, ash value, water soluble extractive, alcohol soluble extractive, pH were carried out.

Finished Product Analysis

Balchaturbhadra syrup was prepared by different media like *Hima, Phanta, Kwatha* and *Arka*. The finished syrups samples were analyzed for organoleptic characters, physicochemical parameters and chromatographic fingerprinting.

HPTLC fingerprinting of Balchaturbhadra syrup (Hima, Phanta, Kwatha and Arka)

Preparation of test solutions (T):

Accurately weighed 10.0 g of sample individually in 50 mL Measuring cylinder and add methanol to it up to 25 mL mark. Shake it with glass rod and allow it to stand for 10 min, centrifuge it for 10 minutes at 2000 RPM, filters it with Whatman filter paper no. 1 and then concentrate it on water bath up to 10mL and use for HPTLC profiling. HPTLC was done by adopting solvent system of Toluene : Ethyl acetate : Formic acid (7:3:1) over MERCK - TLC / HPTLC Silica gel 60 F254 on Aluminum sheets. Spots of Balchaturbhadra Kwatha, Hima, Phanta and Arka syrup were placed on HPTLC plate and observed under 254nm, 366nm, 566nm frequency wavelength of UV light. Derivation was done by Anisaldehyde Sulphuric acid reagent.

RESULT AND DISCUSSION

Table no.3: Physicochemical parameters of raw drugs

Si. No	Parameters	Ativisha	Pippali	Musta	Karkatshringi
1	Foreign matter	Nil	5%	3%	1%
2	Loss on drying at 105°C	9%	8%	5.5%	6.5%
3	Total Ash value	3.5%	5%	6%	8%
4	Acid insoluble ash	1.5%	1.1%	5%	1.5%
5	Water soluble extractive	26.04%	25%	32%	37.33%
6	Alcohol soluble extractive	8.8%	12%	8%	32%
7	pH	4	6	5	2

Table no.4: Organoleptic parameters of four Balchaturbhadra Syrups

Sr.	Parameters	Kwatha syrup	Hima syrup	Phanta syrup	Arka syrup
1	Description	Brown color viscous liquid	Brown color viscous liquid	Brown color viscous liquid	Transparent viscous liquid
2	Odor	Characteristic	Characteristic	Characteristic	Characteristic
3	Taste	Sweet	Sweet	Sweet	Sweet

Table no.5: Physicochemical parameters of four syrups

Sr.	Parameters	Kwatha syrup	Hima syrup	Phanta syrup	Arka syrup
1	pH	4.84	4.93	4.91	5.83
2	Total solid content	87.12%	77.49%	80.61%	76.09%
3	Specific gravity	1.3337	1.3476	1.3468	1.3379
4	Viscosity	452.25	92.64	93.21	100.03
5	Total sugar content	85.57	85.19	95.40	85.54

Table no.6: Microbial Analysis of Syrups

Sr.	Microbes	Kwatha syrup	Hima syrup	Phanta syrup	Arka syrup
1	Total Plate Count (NMT 10^5cfu/g)	44cfu/gm	100cfu/gm	856cfu/gm	1316cfu/gm
2	Total Yeast and Mould Count (NMT 10^3cfu/g)	Absent	Absent	Absent	Absent
3	*E. coli*	Absent	Absent	Absent	Absent

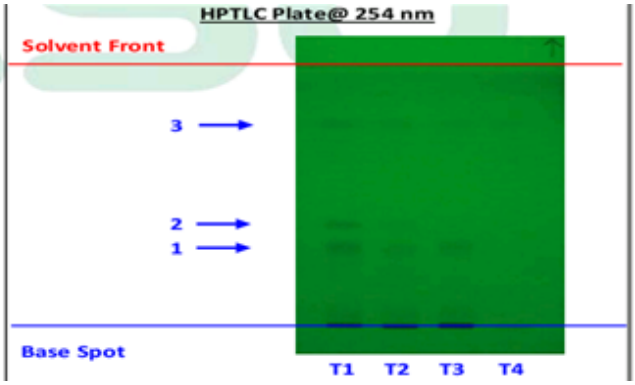
4	*Salmonella*	Absent	Absent	Absent	Absent
5	*S. aureus*	Absent	Present	Absent	Absent
6	*P. aeruginosa*	Absent	Absent	Absent	Absent

HPTLC Rf values at 254nm

R_f @ 254 nm

Spot No.	Track-1	Track-2	Track-3	Track-4
1	0.31	0.30	0.31	-
2	0.40	0.39	0.39	-
3	0.78	0.78	0.78	0.78

Track -1: Balchaturbhadra Syrup-Kwath
Track -2: Balchaturbhadra Syrup-Hima
Track -3: Balchaturbhadra Syrup-Phant
Track -4: Balchaturbhadra Syrup-Arka

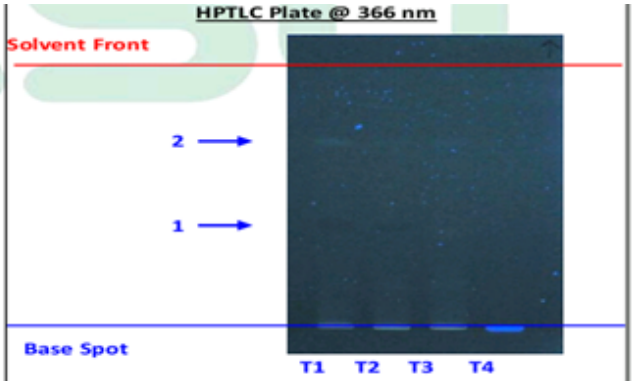


HPTLC Rf values at 366nm

R_f @ 366 nm

Spot No.	Track-1	Track-2	Track-3	Track-4
1	0.40	0.40	0.40	-
2	0.71	0.71	0.71	0.71

Track -1: Balchaturbhadra Syrup-Kwath
Track -2: Balchaturbhadra Syrup-Hima
Track -3: Balchaturbhadra Syrup-Phant
Track -4: Balchaturbhadra Syrup-Arka



HPTLC Rf values at 540nm

R_f @ 540 nm

Spot No.	Track-1	Track-2	Track-3	Track-4
1	0.40	0.39	0.39	0.39
2	0.80	0.80	0.80	0.81

Track -1: Balchaturbhadra Syrup-Kwath
Track -2: Balchaturbhadra Syrup-Hima
Track -3: Balchaturbhadra Syrup-Phant
Track -4: Balchaturbhadra Syrup-Arka

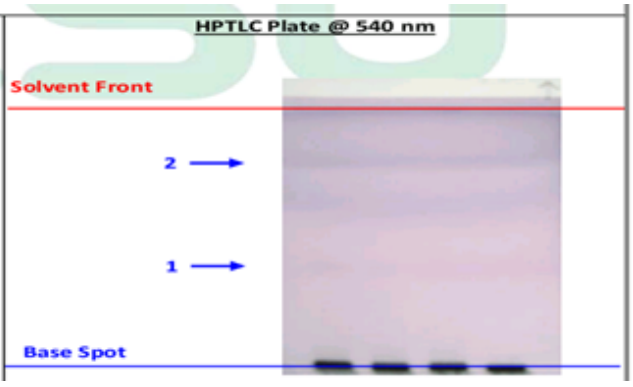


Table no.7: Comparative HPTLC

Refractive value	Tract 1	Tract 2	Tract 3	Tract 4
Rf@254nm	0.31, 0.40, 0.78	0.30, 0.39, 0.78	0.31, 0.39, 0.78	0.78
Rf@366nm	0.40, 0.71	0.40, 0.71	0.40, 0.71	0.71
Rf@540nm	0.40, 0.80	0.39, 0.80	0.39, 0.80	0.39,

Track -1: Balchaturbhadra Syrup-Kwatha, Track -2: Balchaturbhadra Syrup-Hima

Track -3: Balchaturbhadra Syrup-Phanta, Track -4: Balchaturbhadra Syrup-Arka

DISCUSSION:

The main aim of SOP is to achieve efficiency, quality output and uniformity of performance. Here an attempt was made to develop SOP for *Balchaturbhadra* syrup prepared using different media as *Kwatha, Hima, Phanta,* and *Arka.*

In this section of study total of 12 samples of *Balchaturbhadra* syrup has been prepared under the mentioned protocol. Among *Kwatha, Hima* and *Phanta,* the consistency of *Kwatha* was thicker compared to *Hima* and *Phanta* because forner was given more heat, *Hima* was less thick in consistency because there was no heating.

As per reference in *Hima kalpana, Agni samyoga* is not given because it can destroy the properties. But in *Sarkara kalpana* reference, *Acharya* mentioned to give heat to any liquid like *Hima, Phanta, Kwatha* or *Arka.* If *Agni samyoga* is not given then shelf life of it is very less. So heat was given in *Hima* syrup to increase shelf life and to maintain criteria of *Sarkara kalpana.*

For *Arka* preparation, general water ratio is 1:10 but there is no such reference of water ratio is found in *Arkaprakash.* According to this book different water ratio is given as per the hardness of drug.

In book like *Ayurveda Sarasangtaha* and other text books, water ratio is mentioned for some *Arka* preparation. One batch was prepared by taking 1:6 ratios of drug and water but by this method *Arka* was not clearly transparent; it was more turbid therefore this batch prepared with this ratio was discarded.

There is more concentration in *Arka* than from *Hima, Phanta,* and *Kwatha* so after preparation of *Arka* one should have to reduce the dose

of *Arka* or *Arka* should be given clinically after dilution.

The details of organoleptic studies are recorded by direct perception. The physico-chemical parameters are recorded separately for *Balchaturbhadra Hima, Phanta, Kwatha* and *Arka* syrup.

- pH value of all the syrups is acidic. It may be due to chemical constituents present in the formulation or may be due to the conversion of glucose into acids during the preparation.
- Total solid content is found more in *Kwatha* syrup and less in *Arka* syrup it may be due to the presence of more solid particle in *Kwatha.*
- There is a major difference in viscosity. *Kwatha* syrup has high viscosity and compared to it *Hima* syrup is less viscous. There is a minimum difference in specific gravity of all 4 syrups.
- Total sugar content is high almost around 85% which acts as a self-preservative.
- In microbial analysis *S. aureus* microorganism was found in the *Hima* syrup, might have come from the atmosphere into samples during opening and transferring of sample into other containers. Another reason for presence of these microorganisms may be lack of boiling of water in *Hima*.
- In comparative HPTLC it was observed that under 254nm, total 3 spots were found in *Kwatha, Hima* and *Phanta* syrup and only one spot was found in *Arka* syrup. At 366nm, total 2 spots were found in *Kwatha, Hima* and *Phanta* syrup and only one spot was found in *Arka* syrup and under 540nm, total 2 spots were found in all 4 syrups. Active constituents seen less in *Arka*, the one reason is that it is transparent liquid containing volatile oils.

Depending on the number of spots, one can represent the number of active constituents present. The *Kwatha, Hima* and *Phanta* syrup show various numbers of spots. $R_f$value at 0.70 and 0.78 were common active principles found in all samples. In these syrups, some spots were found in same R_f value but the intensity differed and some spots were found in different R_f values.

CONCLUSION:

The alternate hypothesis is accepted as there is significant qualitative difference in *Balchaturbhadra* syrup prepared by different methods.

In HPTLC, Kwatha, Hima and Phanta have same active principles so we can prepare syrup by using any of these media but to increase shelf life of Hima and Phanta syrup, we should add more preservatives. From this study, it can be concluded that *Balchaturbhadra* syrup prepared from *Kwatha* is superior as compared to other media.

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