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***ORIGINAL RESEARCH ARTICLE***

# Pharmaceutical Evaluation of Brihatpanchamoola Kwatha Prepared By Root Bark And Stem Bark

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## ABSTRACT

Brihatpanchamoola is an extensively used Ayurvedic combination of five root barks for curing different diseases. However, as per requirements, the root bark of these drugs are not available in the market. Therefore, many industries are using stem bark instead of root bark during preparation of respective formulations. Thus, in the present study, the Kwatha prepared from root bark and stem bark of Brihatpanchamoola has been evaluated on analytical parameters. The organoleptic, physicochemical characteristics and qualitative estimation of functional groups for both the samples revealed similar results except for the absence of saponins in root samples. HPTLC profile showed presence of more chemical moieties in raw stem bark in comparison to root bark. However, these findings were reversed in case of Kwatha prepared from the same. Analytically, the study reveals that root bark of Brihatpanchamoola can be effectively substituted by stem bark for almost all practical purposes.

**Key words:** Brihatpanchamoola, Kwatha, HPTLC

## INTRODUCTION

Dashamoola[1] is a unique contribution of our ancient seers. It is indeed an excellent combination of Brihat and Laghupanchamoola with a multi dimensional action. Brihatpanchamoola, as the name suggests is a combination of five root barks in equal proportion i.e. Bilwa (*Aegle marmelos* Carr.), Agnimantha (*Clerodendrum phlomidis* Linn.), Shyonak (*Oroxylum indicum* Vent.), Gambhari (*Gmelina arborea* Roxb.), Patla (*Stereospermum suaveolens* DC.). This can be seen not only from its potency but also wide spread acceptance. However, the process of standardization of single herbal drug has brought controversy regarding genuineness of the drugs. Availability in large quantity to necessitate ever-increasing demands in recent years is also a matter of concern. Taking root for medicinal purpose renders the plant useless for its further use as it may become fatal to it. In such conditions, scarcity of genuine drug further hampers its usage. Owing to the shortage of genuine drug and ever increasing demands in market, it becomes necessary to search an alternative with equal efficacy without compromising the source. Hence, stem barks of the same species are being used in the present scenario.

Kwatha Kalpana is widely accepted for therapeutic purposes due to feasibility in preparation and convenience of administration. Moreover, Panchamoola are generally administered in the form of Kwatha to treat various diseases. Therefore, for establishing the rationality of its usage, present work has been carried out and Kwatha of Brihatpanchamoola prepared from root and stem bark have been selected. Evaluation of Brihatpanchamoola Kwatha prepared from root and stem bark was done on the basis of pharmaceutical and analytical studies.

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## MATERIAL AND METHODS:

**Pharmaceutical study**:

Brihatpanchamoola was collected from the Dang**D.** forest (Dang District, Gujarat) after obtaining due permission from the concerned authorities. The raw drug samples were collected separately, packed in polythene bags and labelled with name, part, place and date of collection. Samples of the raw drugs were shade dried and subjected to pharmacognostical study for confirmation of the genuineness.

Brihatpanchamoola Kwatha was prepared as per the reference of Sharangadhara Samhita[2]. The ratio of ingredients has been shown in (**Table 1**.) Brihatpanchamoola were powdered individually in disintegrator and passed through mesh no. 08. Then required amount of potable drinking water was mixed with coarse powder in a stainless steel vessel and kept for overnight soaking (12 h). Next day, Kwatha was prepared by applying constant mild heat until the volume reduced up to 1/8$^{th}$ of the initial quantity. After desirable reduction of volume, the Kwatha was filtered through four folded cotton cloth and collected in a separate vessel. The residue remained above cloth was discarded. The results obtained during the preparation of Brihatpanchamoola Kwatha have been tabulated in (**Table 2 & Table 3).** Total 3(three) batches of Kwatha were prepared. Similarly Kwatha from stem bark samples were also prepared.

**Analytical Study:**

Raw drugs i.e. root and stem bark of Brihatpanchamoola were taken for analysis by using method of sampling[3] as well as Kwatha prepared from root and stem bark were analysed by adopting various related analytical parameters, like;

**A. Organoleptic characteristics:** Colour, odour, taste and appearance of Kwatha were observed and mentioned in the (**Table 4)**.

**B. Physico-chemical analysis:** Loss on drying at 110°C[4], ash value[5], acid insoluble ash[6], pH value[7], specific gravity at 40$^0$C[8], total solid content[9], water soluble extractives[10], methanol soluble extractives[11] was carried out for raw materials and results are mentioned in (**Table 5)**. However, for Kwatha total solid content, pH value, specific gravity, viscosity[12] and refractive index[13] were observed and results are mentioned in **Table 7.**

**C. Qualitative test** for various functional groups[14,15] was done and observation and results of the experiment of raw material are asserted in (**Table 5)** and of Kwatha of root and stem bark are asserted in **Table 8.**

**HPTLC profile:**

**Test solution[16]:** Methanolic extracts[9] of raw drugs and Kwatha of Brihatpanchamoola root and stem bark. Chloroform: Acetone (4.6 : 0.37 v/v) was selected as solvent system after multiple trials and error method. The developed plate was visualised under visible day light, short UV (254 nm), long UV (366 nm) and after spraying with anisaldehyde-sulphuric acid reagent and again observed in daylight. The $R_f$ values are recorded in (**Table 8 & 9. Diagram 1).**

**Discussion**:

Decoction (Kwatha) is an aqueous solution containing the properties of substance or substances that have been processed in it[17]. The purpose of herbal decoction is to extract the water-soluble constituents of herbs by boiling[18]. Quantum of heat and duration of heating are prime concern for preparation of decoction[18]. Soaking of raw material results in the softening of drug due to diffusion of liquid into the raw material because of the osmosis[18]. Due to the presence of hydroxyl group, the raw material swell, which results in the increased diffusion pressure inside the cells, there by ultimately bursting of the cell wall[19]. Continuous heating and agitation during the preparation of decoction enhances the extraction process by weakening the bonds and there by separating the hydrophobic substances from hydrophilic substances[18]. The water diffuses into the raw material, dissolves the water soluble constituents and discharges it to the liquid media due to collapse of the cell wall. Thus, transfer of water soluble principle into the solvent (Water) is achieved. Temperature is an important factor because there are chances that it can decompose some of the thermo labile active constituents. Therefore, during the preparation of decoction, temperature was maintained between 85 - 90$^0$C[20]. Fresh raw drug samples were shade dried and made in to coarse powder by processing in disintegrator separately, and sieving through 8 no. mesh. The material was soaked overnight and then subjected to heat. Stirring was done during the preparation of decoction to get uniform concentration throughout the solvent and also to protect the drug from burning. Vapours were seen rising from the surface of the decoction around 70$^o$C. Decoction started boiling at around 95$^o$C. It takes about an average of 4 hours of boiling to prepare the decoction. After the preparation of decoction, it was filtered to remove the unwanted

material and collected in an air tight container for analysis.

Ash value of raw sample of root bark was found to be 2.77 w/w whereas that of stem bark was 7.605 w/w shows presence of more inorganic matter in stem bark than root bark. Alcohol and water soluble extractive of root bark's samples was found to be more shows presence of more alcohol and water soluble constituents in comparison to stem bark. Ash value and extractive values shows that root bark is more suitable for the preparation of various Kalpanas. Rest all the parameters were found to be similar in both the groups. Qualitative analysis reveals that saponin was not found in the root bark sample and remaining functional group was same in both samples. Presence of Saponin in stem bark kwatha may make it more potent on pharmacological or clinical trials as a new chemical entity is present more than root samples. Organoleptic observation reveals that both Kwatha were having similar characteristics except that Kwatha of root is darker than stem bark. Total solid contents were found more in kwatha of root samples it may be due to more water soluble extractive values as seen of raw samples of root.

HPTLC profile (Diagram No. 1) showed presence of more chemical moieties in stem bark in comparison to root bark of raw Brihatpanchamoola whereas the findings were reversed in Kwatha samples. Kwatha of root bark showed presence of more functional components in comparison to Kwatha prepared from stem bark of Brihatpanchamoola.

**Conclusion**:

On account of analytical study it can be concluded that raw samples of stem bark of Brihatpanchamoola are rich in functional components in comparison to root although Kwatha prepared from root is richer then stem bark Kwatha. Raw samples of Brihatpanchamoola root are devoid of saponins.

Establishment of stem bark as a substitute for root requires extensive pharmacological studies and clinical trials.

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**Table 1: Showing formulation composition of Brihatpanchamoola Kwatha prepared from root bark and stem bark;**

| Sr. No. | Drugs | Latin name | Qty. (*g*) |
|---|---|---|---|
| 1. | Bilwa | *Aegle marmelos* (Linn.) | 100 |
| 2. | Agnimantha | *Clerodendrum phlomidis* (Burm. f.) | 100 |
| 3. | Shyonaka | *Oroxylum indicum* (L.) Vent. | 100 |
| 4. | Patala | *Stereospermum suaveolens* (Roxb.) | 100 |
| 5. | Gambhari | *Gmelina arborea* (Roxb.) | 100 |
| 6. | Water | | 8 *l* |

**Table 2: Observations and results obtained during preparation of Brihatpanchamoola Kwatha by root bark;**

| Parameters | Batches | | | Avg. |
|---|---|---|---|---|
| | I | II | III | |
| Initial qty. of Kwatha Churna (g) | 500 | 500 | 500 | 500 |
| Size of the Kwatha Churna (mesh no. up to) | 08 | 08 | 08 | 08 |
| Total qty. of water (*l*) | 8.00 | 8.00 | 8.00 | 8.00 |
| Total time for soaking (*h*) | 12 | 12 | 12 | 12 |
| Temp. during preparation of Kwatha, after 1 h ($^0$C) | 80-90 | 80-90 | 80-90 | 80-90 |
| Total time taken for 1/8$^{th}$reduction (*min.*) | 240 | 225 | 210 | 225 |
| Total qty. of Kwatha obtained (*ml*) | 1100 | 1090 | 1050 | 1080 |

**Table 4: Results of physico- chemical analysis of raw drugs (Brihatpanchamoola);**

| Sr. No. | Parameters | Root bark | Stem bark |
|---|---|---|---|
| 1. | Foreign mater (% w/w) | Nil | Nil |
| 2. | Loss on drying (% w/w) | 7.136 | 6.935 |
| 3. | Total ash (% w/w) | 2.77 | 7.605 |
| 4. | Acid insoluble ash (% w/w) | 0.01 | 0.02 |
| 5. | Water Soluble extractive (% w/w) | 20.4 | 17 |
| 6. | Alcohol soluble extractive (% w/w) | 14.3 | 8.6 |
| 7. | pH | 5.85 | 5.90 |

**Table 5: Results of qualitative analysis of raw drugs (Brihatpanchamoola) and Kwatha;**

| Sr. No. | Chemical constituents | Root bark (Kwatha) | Stem bark (kwatha) |
|---|---|---|---|
| 1 | Alkaloid | + ve | + ve |
| 2 | Tannin | + ve | + ve |
| 3 | Saponin | – ve | + ve |
| 4 | Cyogenic glycosides | + ve | + ve |
| 5 | Flavanoids | +ve | + ve |
| 6 | Phenols | +ve | + ve |

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**Table 6: Organoleptic characters of Brihatpanchamoola Kwatha;**

| Sr. No. | Organoleptic characters | Root | Stem bark |
|---|---|---|---|
| 1 | Colour | Brown | Brown |
| 2 | Odour | Characteristic | Characteristic |
| 3 | Appearance | Dark | Dull |
| 4 | Taste | Bitter | Bitter |

**Table 7: Results of physicochemical parameters of Brihatpanchamoola Kwatha;**

| Sr. No. | Parameters | Root bark | | | Stem bark | | |
|---|---|---|---|---|---|---|---|
| | | I | II | III | I | II | III |
| 1 | Total Solid Content (% w/v) | 5.38 | 5.05 | 5.04 | 4.75 | 4.90 | 4.50 |
| 2 | pH | 5.66 | 5.71 | 5.80 | 5.66 | 5.82 | 5.74 |
| 3 | Specific Gravity | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 |
| 4 | Viscosity (millipoise) | 9.35 | 9.41 | 9.38 | 9.73 | 9.87 | 9.79 |
| 5 | Refractive Index | 1.35 | 1.35 | 1.35 | 1.34 | 1.34 | 1.34 |

**Table 8: Maximum Rf values of raw materials (Btihatpanchamoola);**

| Yavakuta of root bark | | | | Yavakuta of stem bark | | | |
|---|---|---|---|---|---|---|---|
| λ Max. 254 nm | | λ Max. 366 nm | | λ Max. 254 nm | | λ Max. 366 nm | |
| No. of Spots | Max. $R_f$ | No. of Spots | Max. $R_f$ | No. of Spots | Max. $R_f$ | No. of Spots | Max. $R_f$ |
| 5 | 0.04, 0.24, 0.28, 0.34, 0.59 | 2 | 0.04, 0.88 | 10 | 0.05, 0.09, 0.16, 0.28, 0.30, 0.36, | 7 | 0.05, 0.09, 0.16, 0.28, 0.30, 0.36, |

**Table 9: Maximum $R_f$ values of Btihatpanchamoola Kwatha;**

| Root bark Kwatha (RK) | | | | Stem bark Kwatha (SK) | | | |
|---|---|---|---|---|---|---|---|
| λ Max. 254 nm | | λ Max. 366 nm | | λ Max. 254 nm | | λ Max. 366 nm | |
| No. of Spots | Max. $R_f$ | No. of Spots | Max. $R_f$ | No. of Spots | Max. $R_f$ | No. of Spots | Max. $R_f$ |
| 13 | 0.05, 0.14, 0.21, 0.27, 0.34, 0.41, 0.45 | 4 | 0.05, 0.34, 0.41, 0.55 | 4 | 0.04, 0.20, 0.28, 0.53 | 1 | 0.03 |

## Diagram No. 1:

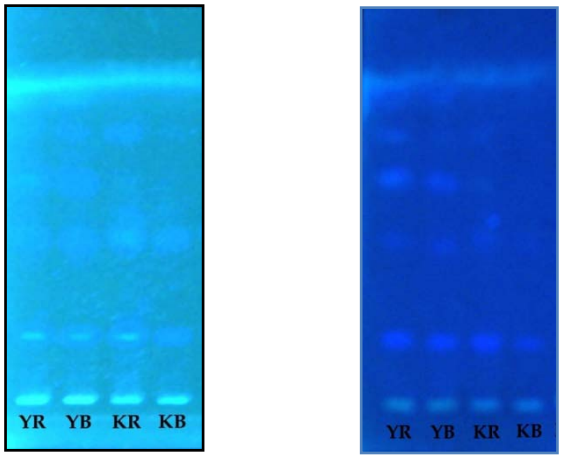


Fig. 1: Chromatographic separation at 254 nm
Fig. 2: chromatographic separation at 366

YR : Raw material
YB : Raw material
KR : Decoction of Root
KB : Decoction of stem

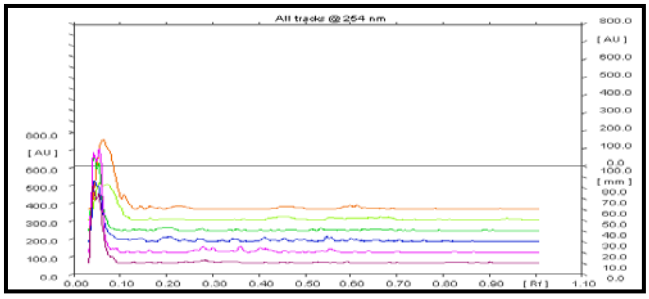


Fig. 3: Chromatographic comparison of all tracks in HPTLC at 254 nm.

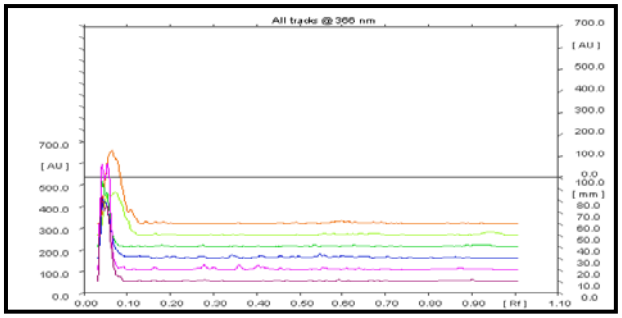


Fig. 4: Chromatographic comparison of all tracks in HPTLC at 366 nm.

Raw material (root) : Red
Raw material (stem bark) : Pink
Decoction (root) : Blue
Decoction (stem bark) : Dark Green

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