



Research Article

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EVALUATION OF STORAGE DEPENDENT STABILITY OF *PICRORHIZA KURROA* POWDERED DRUG (KUTKI CHURNA) BY HPLC STUDY

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ABSTRACT

Ayurveda, the eternal life science, has vast heritage of knowledge with its well established basic principles. The concept of stability is one of such important issues regarding Ayurvedic drug formulations. Sharnagadhara Samhita (14th century A.D.), the pioneer in this regard, gave detailed description of this concept. According to this reference churna kalpana is potent up to two months after which it starts to degrade gradually. In those days of Acharya Sharnagadhara it has been advocated to make use of fresh herbs for manufacturing different drug formulations which is not feasible in the present era of widely expanded commercialized pharma sector due to various factors like availability of the herbs, increasing pollution and deforestation, etc. Therefore it's the need of the hour to focus our attention on the stability of Ayurvedic drugs. Churna Kalpana, the most commonly used Ayurvedic drug formulation by almost all Ayurvedic practitioners, has been considered for assessing and revisualising the stability concept. Kutaki churna was tested after a successive interval of two months. Two types of packaging were considered for this study. No special storage conditions were provided let all the environmental factors affect these drugs as they can. So storage conditions were same for both the drugs. Here in the present article a scientific and rational attempt has been made to establish the concept of stability of Ayurvedic single herbal powder drug formulation (churna kalpana) by using a new scientific modern technique of chromatography i.e. HPLC. Along with HPLC some physico-chemical tests were also performed to check the stability of the formulation. Results obtained show the degradation in these drugs in a specific manner with respect to the packaging which has been elaborated in the article.

Keywords: Kutaki churna, HPLC, churna kalpana

INTRODUCTION

Ayurveda is the incarnation of the imagination of an ideal health. It emphasizes on the maintenance of health of healthy individuals along with treating the diseased persons.

In ancient time stress has been laid on the use of fresh herbs. Thus the problem of storage and stability of pharmaceutical products was not so vexatious as today. But on the contrary, in the prevailing situation the problem of raw drug storage for year round supply, commercialization of pharma sector, deforestation, etc. has created a need to check the quality and potency of drugs in order to make them more and more efficacious.

A drug (An Aushadha) can be any substance possessing its own potency capable to alleviate the disease and render a sense of intrepidity to patient.

The potency of any drug may be very well assessed by the data obtained from stability profile.

Here, in the present article efforts have been made to check the stability of Ayurvedic single herbal drug preparation in the powder (churna) form by using the scientific modern technique of High Performance Liquid Chromatography (i.e.H.P.L.C.)¹. HPLC is one of the best separation techniques of chromatography showing the concentration of different phytochemicals in the herb used. So it gives a guideline to know the deterioration occurring in the drug formulation. Here in this study two active principles of *P.Kurroa* i.e. *kutkoside* and *picoside*, have been considered. HPLC depicts the minute changes occurring in these two active phytochemicals in the form of area concentration. Thus HPLC helps to know about

the concentration (deterioration) of the drug and hence the stability. Some Physico-Chemical tests were also performed to assess the stability of the concerned drug formulation.

Churna (powder) preparations are widely and largely used in pharmacy as well as by practitioners of Ayurveda for different ailments. According to Ayurvedic pharmaceutical science, churna preparations remain potent up to two months² (13th century A.D., Sharnagadhara Samhita), after which they start degrading gradually thus losing their efficacy. Nevertheless, they don't become de-efficacious to that much level that can't be employed for therapeutic uses.

The two months of potency span or shelf-life of churna preparations is explained in the context of the storage techniques and packaging methods of those days of Sharnagadhara i.e. 13th century A.D.

MATERIALS AND METHODS

Two types of packaging methods have been used for evaluation of storage dependent stability of the *Picrorrhiza Kurroa* Royale ex. Benth (Kutaki) churna preparations, viz.,

- 1) Polythene pack, i.e. powdered drug was packed in a polythene bag.
- 2) Foil pack, i.e. powdered drug was packed in a plastic container having aluminium foil covering.

Description of the herb

Picrorrhiza Kurroa Royale ex. Benth³ rhizome (i.e. kutaki) market sample was selected for experimental

work. The drug (plant) is widely distributed in north-western Himalayas approximately at altitude of 2700-4500 m.

The drug is sold in market under different names such as-

- Sans. - Katambhara, Matsyashakala, Tikta, katurohini.
- Mar.- Kutaki
- Guj. – Kandu
- Bang. and Hindi – Kutaki, karu
- Mal. – Katukhyrohani

Macroscopic

Rhizome 2.5-6.0 cm long and 0.5 -1.0 cm thick , sub cylindrical, straight, externally grayish- brown, surface rough due to longitudinal wrinkles; tip ends in a growing bud surrounded by tufted crown leaves.

Microscopic

Rhizome T.S. shows 20-25 layers of the cork cells. In some cases one or two small vascular bundles are present in the cortex. Tracheids are long, with lignified thick walls and more or less cylindrical with blunt tapering ends. Starch grains were present abundantly in all cells.

Chemical constituents

Major- Irioid glycosides, picoside I and kutkoside⁴

Minor- include picoside III, vernicoside, etc.

The dried rhizome of the drug were finely powered at 80 mesh and packed in above two types of packing and kept under similar conditions and were subjected to HPLC testing at a regular interval of two months.

All the chemicals used were of HPLC grade.

Sample preparations

5 gm. powder of *P. Kurroa* was extracted with 300 ml ethanol by using reflux filtration method till complete extraction of *P.kurroa* is attained (i.e. for at least 3 to 4 hrs.)⁵

Filtrate so obtained by above process is evaporated to dryness. Then evaporated dried filtrate was dissolved in 10 ml methanol and volume was raised to 25 ml with methanol in volumetric flask. This solution was named as stock solution. 0.4 ml of the stock solution is further diluted to 10 ml by methanol. This solution is used as test solution for evaluation and separation of constituents in *P.Kurroa* (Kutaki) churna.

HPLC method

Each time 20µl of the test solution prefiltered through 0.45 membrane filter was injected into Water's HPLC (Australia) with C-18 RP Bondapack column, setting its pressure by Auto- pressure between 0-4000 P.S.I. and the flow rate was set at 1.5 ml/ min. The solvent system used was methanol: water ; 35:65 by Auto- selector and sample was run for 15 minutes. By PDA detector peaks were observed at 270 nm to have best results.

Following Physico-chemical tests were carried out as per the guidelines of "Ayurvedic Pharmacopoeia of India" published by Govt. Of India, 2001 (Table 1)

Table 1: Physico-chemical tests

S.No.	Physico-Chemical tests
1	Total Ash
2	Loss on Drying
3	Alcoholic extract
4	Water soluble extract
5	Methanolic extract
6	Acid insoluble ash
7	Water soluble ash

Table 2: Values compared in each case between polythene and foil packing

	K0	K2P	K2F	K4P	K4F
Kutkoside concentration	298651	179965	291248	176302	243094
Picoside concentration	1700726	1101023	1429390	782006	907103

Table 3: Physico-Chemical tests

Physico-Chemical tests	K0	K2P	K2F	K4P	K4F
Total Ash	3.82	3.84	3.83	3.95	3.93
Loss On Drying	4.86	5.59	5.12	6.51	6.48
Alcoholic extract	24.93	18.26	19.84	17.83	19.87
Water soluble extract	36.99	32.76	34.42	31.70	32.57
Methanolic extract	39.82	33.27	34.79	32.41	32.87
Acid insoluble ash	0.4	0.42	0.41	0.49	0.47
Water soluble ash	0.82	1.44	1.38	1.48	1.43

RESULTS

Two peaks, one of kutkoside and the other of picoside , were observed at 8 min and 10 min respectively. Area of the peak was taken as measure of the concentration of each constituent. Values obtained were compared in each case between polythene and foil packing as shown in Table 2. Some of the Physico-Chemical tests performed and the results obtained are as given in Table 3. All these tests were carried out as per the guidelines of "Ayurvedic Pharmacopoeia of India" published by Govt. Of India, 2001

K0 - Kutki churna at "0" (zero) month

K2P - Kutki churna packed in a polythene pack after 2 months

K2F - Kutki churna packed in a plastic container with foil after 2 months

K4P - Kutki churna packed in a polythene pack after 4 months

K4F - Kutki churna packed in a plastic container with foil after 4 months

DISCUSSION

From the above table it is clear beyond doubt that the Kutki churna degrades gradually but it is also evident that the powder packed in polythene is more prone to degradation than the foil pack.

The area concentration of kutkoside and picroside of Kutki churna at '0' (zero) month is 298651 and 1700726 respectively. After 2 months the changes noted in polythene pack for these two constituents were 179965 and 1101023; and in case of foil pack after 2 months concentration were 291248 and 1429390 respectively.

Thus kutkoside degradation in case of polythene pack after 2 months is 39.74% and that of picroside is 35.26%. In case of foil pack the percentage degradation of kutkoside and picroside after 2 months was found to be 2.47% and 15.95%

Therefore it is apparently clear that the degradation is more in case of polythene pack than foil pack.

Comparison of K4F to K4P shows the value of kutkoside as 243094:176302 whereas values of picroside for the same comparison are 907103:782006. It is further observed that picroside constituent degrades 43.51% in foil packing in 4 months whereas kutkoside degrades 72% in a foil packing after 4 months. This indicates that kutkoside is more prone to degradation when stored and packed in foil packing.

In case if the matter is examined with reference to polythene packing it is observed that picroside degrades to the level of 51.3% after 4 months time whereas kutkoside degrades to the level of 79.56 %. This again clearly indicates that kutkoside is more susceptible to storage dependent degradation. It is further observed that in both cases i.e. foil as well as polythene packing under similar conditions kutkoside is more susceptible to degradation than picroside. However, both kutkoside and picroside are degraded during prolonged storage. On the basis of the values of the area concentration of the peaks due to kutkoside and picroside, it can be vary well stated that these major constituents of Kutaki start degrade gradually after a period of two months in both types of packing. But the degradation is comparatively more in polythene pack than the foil pack. This lowers the kutkoside and picroside dependent efficacy of the drug.

As regards marginally higher value of picroside after two month time appears to be an experimental error and hence the observation is not considered.

CONCLUSION

The rhizome of *P.Kurroa* has been described in Ayurvedic textbooks as an acrid, stomachic, and in large doses moderately cathartic and is used in fever, dyspepsia and also in purgative preparations. Degradation of these bitter constituents (i.e. kutkoside and picroside) lowers the efficacy and /or potency of the drug. However, the degradation in foil packing is lesser than polythene packing therefore it is strongly recommended that storage should always be done in foil packed plastic container instead of mere polythene packing. It is likely that the penetration of light, air and moisture through polythene pack might be causing higher degradation in the quality of the drug. It clearly indicates that in a foil packing degradation in kutkoside and picroside is lesser in comparison to polythene packing. Further it is also derived that as far as possible powdering of the drug may only be achieved immediately before use. As already mentioned this is just an attempt to revisualise and establish the concept of stability on certain modern parameters. More work in this direction will definitely help to achieve new horizons in the field of Indian System of Medicine.

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