RESEARCH ARTICLE

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UV Spectroscopic Analysis of Media (*Takra* and *Saindhava*) Used for Sodhana of *Langali* (*Gloriosa superba* Linn.) Root

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Abstracts: *Shodhana* (purification), one of the procedures mentioned in Ayurveda, has been recommended for many drugs of both poisonous and non poisonous category, by different Ayurveda pharmacopoeias. For this purpose, various media, responsible for desired changes in the drug, are used before the use of certain poisonous plants in the formulation. UV spectroscopy technique was used to assess the changes taking place in the media, during *shodhana* procedure. In this study, the media, a mixture of *takra* (butter milk) and *saindhava* (rock salt) used, for seven days, for the *shodhana* of root of *Langali* (*Gloriosa superba* Linn.), a drug of *upavisaha* (semi-poisonous) group, was subjected to UV spectroscopic analysis. The result was analyzed by Principal Component Analysis (PCA) technique, using unscrambler software. Analysis of the results of UV spectroscopy from the range of 200 to 400 nm does not show significant changes, in the media, after four days. Physicochemical analysis of the samples before and after *shodhana* was also done. The values such as total ash, water and alcohol soluble extractive values of the shodhita samples were found to be increased. Qualitative analyses of samples show presence of alkaloids, saponin, tannins and carbohydrates before and after *shodhana* procedures.

INTRODUCTION

Shodhana (purification), one of the procedures mentioned in Ayurveda, has been recommended for many drugs of both poisonous and non poisonous category, by different Ayurveda pharmacopoeias. Duration of the *shodhana* procedures, in terms of time and number, also differs in many drugs. [1] Hence, it is praiseworthy to find the difference taking place in the drug and media, after *shodhana*. Analysis of media, used for *shodhana,* can throw some light on the changes taking place in the herb or the drug.

Absorbance spectroscopy is a technique useful in various conditions such as detection of impurities, structure elucidation of organic compounds, quantitative analysis, qualitative analysis, chemical kinetics, quantitative analysis of pharmaceutical substances etc. When there are several components in a mixture which absorb at the same wavelength their absorbances add together, the absorbance of the sample is proportional to the concentration of one component. In these cases, several approaches can be adopted with the most important being chemical reaction and multi-wavelength measurements. Presence of chromophore and auxochrome causes alteration in absorption. [2]

Langali (*Gloriosa superba* Linn.), one of the plant categorized under *upavisha varga*, is used in various formulations in Ayurveda and useful in various ailments such as *kushtha* (skin diseases), *shopha* (inflammation), *vrana* (wound), *krumi* (worm infestation) etc. and in various formulations used in Ayurveda. [3] Also, shodhana is advised before its internal use. Hence, in this study one of the methods of shodhana of Langali was selected for analysis. [4]

UV spectroscopy was used to analyze the media before and after *shodhana* which may provide some objectiveness to the process of *shodhana* and role of media in the process and the multi-wavelength measurement was used for assessing the changes in the media.

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MATERIALS AND METHODS

In this study, the media, a mixture of *Takra* (butter milk) and *saindhava* (rock salt) used, for seven days, for the shodhana of root of *Langali* (*Gloriosa superba* Linn.), a drug of *upavisaha* (semi-poisonous) group, was subjected to UV spectroscopic analysis.

Collection and Selection of Drug

The tubers of *Gloriosa superba* Linn., after proper identification by taxonomist, were collected from Salem district of Tamil Nadu, from natural source, in the month of December, washed properly, shade dried, preserved in the department in a dry glass container and used as material for the present study.

Collection of Media

Buttermilk of mother dairy was purchased from market and mixed with RO water in the proportion of 1:2 (v/v) (buttermilk: water) and rock salt was purchased from local market and it was added in this liquid in the proportion of 1:5 (v/v).

Procedures

Tubers of the plant were used as material and buttermilk mixed with *saindhava* (rock salt) was used as the medium and rock salt was added in this liquid in the proportion of 1:5 (v/v), [5] it was allowed to settle, supernatant clear liquid was taken and marked as TWS. All the media were collected according to the same procedure. The *shodhana* procedure was carried in three groups (each group for 7 days) to check the variation in the data and they were named as TS, 2TS and 3TS respectively. 100 g of *Langali* tubers were immersed in 250 ml of the solution for 7 days. The tubers were immersed in the media every night and were kept in sunlight during the day. The media were changed every day. After 7th day the tubers were taken out, washed in warm water and dried in sunlight.

The changes in the media were assessed by UV spectroscopy from wavelength of 200 to 800 nm with the intervals of 50 nm i.e. multi-wavelength analysis, by the

Table 1: Showing Weight of the Samples in the Three Groups

Group	Wt. of Sample (G)		Vol. of Media (ml)
	Before Shodhana	After Shodhana	
1	100	91.6	750
2	100	95.2	750
3	100	95.3	750

Table 2: Showing Physicochemical Parameters of Samples Before and After Shodhana

S. No.	Parameters	RL	TS
1	Foreign Matter	Nil	Nil
2	Loss on Drying % w/w	4.05	9.51
3	Total Ash Content % w/w	7.7	16.7
4	Acid Insoluble Ash % w/w	0.64	0.5
5	Water Soluble Extractive Value % w/v	17.35	18.49
6	Alcohol Soluble Extractive Value % w/v	9.52	23.36

RL – Raw Langali tuber, TS – Langali after shodhana in takra and saindhava

Table 3: Showing Qualitative Tests for Various Functional Groups Before and After Shodhana

Functional Group	Tests	RL	TS
Carbohydrate	Molisch test	+	+
Proteins	Biuret test	-	-
Tannin	5% FeCl	+	+
Steroid	Salkowsky reaction	-	-
Alkaloids	Dragendorff's test	+	+
Saponin	Foam test	+	+
Amino acid	Ninhydrin test	-	-
Flavonoid	Lead acetate test	-	-

RL – Raw Langali tuber, TS – Langali after shodhana in takra and saindhava; **+** - present, **-** - Absent

instrument Systronic 2201, India; daily and the observations were analyzed using PCA [6] with the help of unscrambler software. PCA is discrimination tool with vector /trendline which was selected for reduction in the component profile.

The media obtained in every day were assigned as TS1 – takra after 1st day of shodhana, TS2 – takra after 2nd day of shodhana, TS3 – takra after 3rd day of shodhana, TS4 – takra after 4th day of shodhana, TS5 – takra after 5th day of shodhana, TS6 – takra after 6th day of shodhana and TS 7 – takra after 7th day of shodhana.

The samples were also analyzed for their physicochemical characteristics. Standard procedures were followed for carrying out experiments such as loss on drying, total ash content, water soluble extractive etc. [7] and qualitative analysis [8] before and after shodhana.

OBSERVATIONS AND RESULTS

Table 1 shows weight of the samples and volume of media in the three groups.

The results obtained after applying unscramble software to the results of UV spectroscopy from the wavelength from 200 to 400 nm and 200 to 800 nm are shown below. The observations from the wavelengths 400 to 800 nm were not found relevant.

Figure 1, 2 and 3 show the graphs after applying unscramble software to the results of UV spectroscopy.

Figure 1 shows that the values of the samples TS5, TS6 and TS7 fall in one area which shows that these values are similar.

Figure 2 shows the similarity between the samples 2TS5, 2TS6 and 2TS7 which fall in one area.

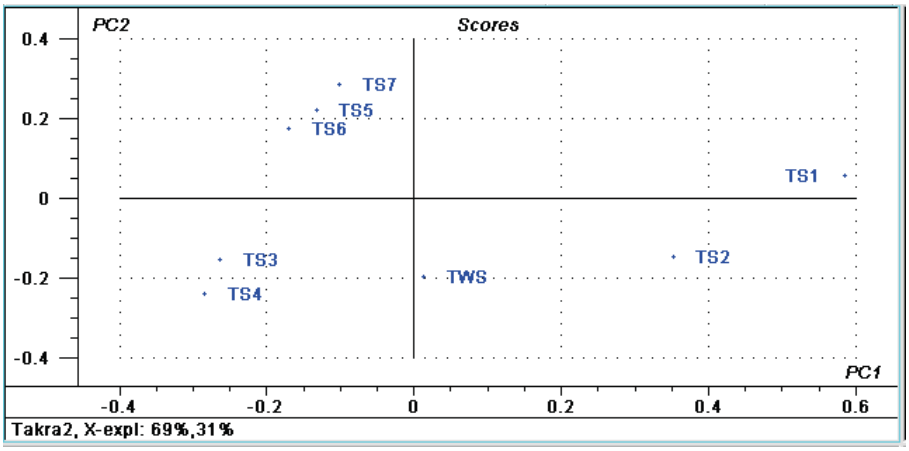
Figure 3 also shows that the values of the samples 3TS5, 3TS6 and 3TS7 fall in one area which shows that these values are similar.

Tables 2 and 3 show physicochemical and qualitative parameters of the Langali samples before and after shodhana procedures.

DISCUSSION

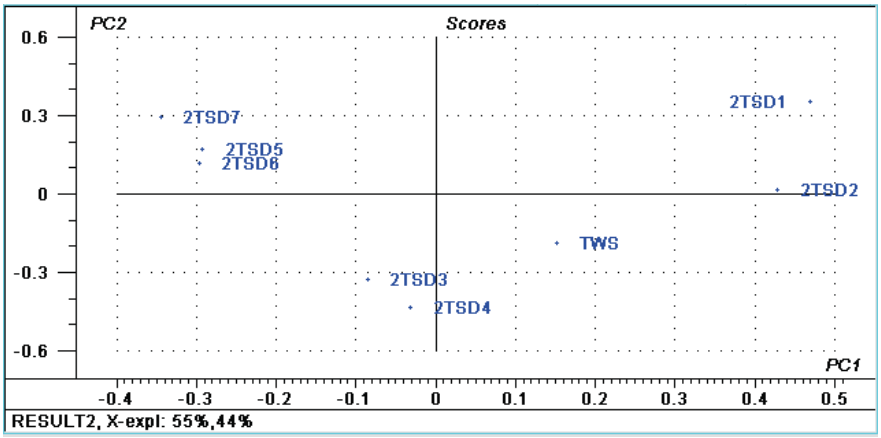
The data in all the three graphs are explainable in PC2 and PC1. All the graphs are in a similar pattern which means that the process which was adopted for the shodhana is repeatable. When results of the UV spectroscopy from 200 to 400 nm and 200 to 800 nm were analyzed it was found that that there was similarity in the media on 5th, 6th and 7th day in all the three samples i.e. we can say that after 4th day media becomes stable and there is no big difference in its composition. However, analysis of spectroscopy from 400-800 nm does not lead to specific pattern.

Loss on drying, total ash, water soluble extractive and alcohol soluble extractive were found to be increased in the samples after shodhana with the media as compared to the samples before shodhana, while acid insoluble ash was found to be decreased after shodhana procedure. Increased total ash states that some substances from butter milk are absorbed in the samples which lead to increased inorganic content of the samples. Increased water and alcohol soluble extractives show that some water soluble and alcohol



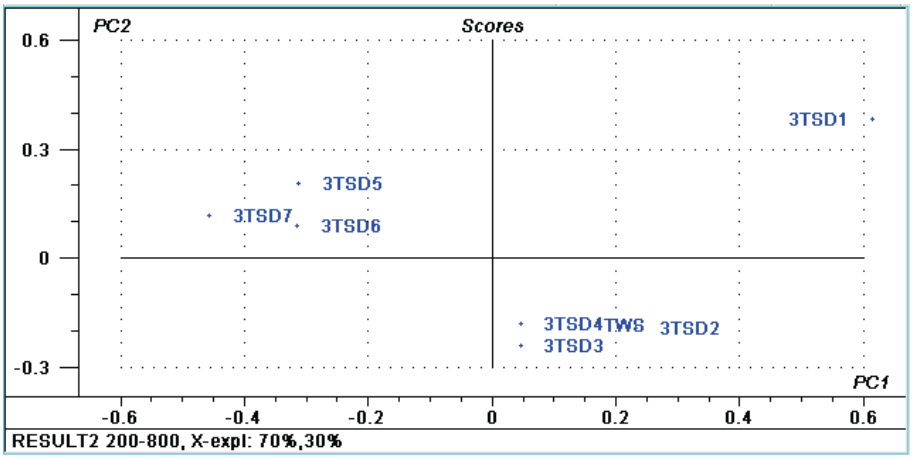
In this figure, TWS – takra without shodhana, TS1 – takra after 1st day of shodhana, TS2 – takra after 2nd day of shodhana, TS3 – takra after 3rd day of shodhana, TS4 – takra after 4th day of shodhana, TS5 – takra after 5th day of shodhana, TS6 – takra after 6th day of shodhana and TS 7 – takra after 7th day of shodhana

Figure1: Showing result of multi-wavelength (200-400 nm) analysis of media of group 1



In this figure, TWS – takra without shodhana, 2 at first stands for sample 2 and 2TS1 – takra after 1st day of shodhana, 2TS2 takra after 2nd day of shodhana, 2TS3 – takra after 3rd day of shodhana, 2TS4 – takra after 4th day of shodhana, 2TS5 – takra after 5th day of shodhana, 2TS6 – takra after 6th day of shodhana and 2TS 7 – takra after 7th day of shodhana

Figure 2: Showing result of multi-wavelength (200-800 nm) analysis of media of group 2



In this figure, TWS – takra without shodhana, 3 at first stands for sample 3, 3TS1 – takra after 1st day of shodhana, 3TS2 – takra after 2nd day of shodhana, 3TS3 – takra after 3rd day of shodhana, 3TS4 – takra after 4th day of shodhana, 3TS5 – takra after 5th day of shodhana, 3TS6 – takra after 6th day of shodhana and 3TS 7 – takra after 7th day of shodhana

Figure3: Showing result of multi-wavelength (200-800 nm) analysis of media sample 3

soluble materials are added in the samples or some insoluble constituents in the sample may have been converted into soluble material components. Qualitative analysis shows presence of alkaloids, saponins, tannins and carbohydrates in the samples before and after shodhana although their quantification was not done.

CONCLUSION

Shodhana of *Langali* in *takra* and *saindhava* is enough for 4 days, and it can be confirmed by doing UV spectroscopy of the media of the range 200 to 400 nm. UV spectroscopy is a non-destructive technique for assessment of the *shodhana* process as the media as a whole can be assessed by it. However, it should be confirmed by repetition of the experiments in other media and other test drugs. Quantification of the chemical constituents may be done before and after following the procedure.

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