



PHARMACOGNOSTIC EVALUATION OF AN INDIGENOUS AYURVEDIC POLYHERBAL FORMULATION: SUMUKTI SYRUP

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DOI: 10.7897/2277-4572.075104

Received on: 01/08/18 Revised on: 22/08/18 Accepted on: 08/09/18

ABSTRACT

The present study is an effort to develop a polyherbal formulation (*Sumukti* Syrup) to treat alcohol dependency and its standardization. The compound is prepared with herbs that are nootropic (*Medhya*), immunomodulators (*Rasayana*), carminating (*Deepana*) and with hepatic stimulants (*Yakrituttejaka*) properties. The ingredients are *Kiratatikta* (*Swertia chirata*), *Draksha* (*Vitis vinifera*), *Katuki* (*Picrorhiza kurroa*), *Bhringaraja* (*Eclipta alba*), *Mandookaparni* (*Centella asiatica*), *Guduchi* (*Tinospora cordifolia*), *Hareetaki* (*Terminalia chebula*), *Vibhitaki* (*Terminalia belerica*), *Amalaki* (*Embllica officinalis*), *Ashwagandha* (*Withania somnifera*) and *Yastimadhu* (*Glycyrrhiza glabra*) which is prepared in Syrup form following standard protocols. The raw materials were collected, authenticated and standardized as per Department of AYUSH, Ministry of Health & Family welfare, Government of India guidelines. In the present study, the physico-chemical parameters in terms of total ash, acid insoluble ash, water soluble extractive value and alcohol soluble extractive value of the raw materials are comparable with pharmacopeia standards. HPTLC photo documentation of raw materials as well as finished product provided a hint towards isolation of few constituents to the finished product. The results of total solids, total sugar, reducing sugar, non-reducing sugar, specific gravity and refractive index of study formulation can be considered as preliminary standards.

Key words: Syrup, Polyherbal, Standardization, HPTLC, *Sumukti*

INTRODUCTION

Since time immemorial, plants were the natural resources for food, clothing, shelter, and medicine. Treatment of illness was carried out by using plants, animal parts, and minerals that were not part of their usual diet¹. In all probability trial and error methods were used by ancient scholars to distinguish useful plants, beneficial effects, combinations and processing techniques to get consistent and optimal results. In due course of time, the art of converting raw drugs into medicine developed as a science. According to nativity and cultures of different geographical regions, number of formulations using single and compound raw materials was invented.

All medicines, whether synthetic or of plant origin, should fulfill the basic requirements of being safe and effective²⁻³. Standardization of herbal medicines is the process of prescribing a set of standards or inherent characteristics, constant parameters, and definitive qualitative and quantitative values that carry an assurance of quality, efficacy, safety, and reproducibility⁴.

It is common to have many plant ingredients in a herbal formulation. Due to the complex nature and variability of the constituents, herbal preparations are likely to have variations right from the stage of collection of raw materials. In the past, due to the absence of a standard reference for identification, it was difficult to establish the quality control measures for polyherbal formulations. However, nowadays, efforts have been

made so that herbal preparations comply with the consistent standards through modern analytical techniques⁵.

Sumukti syrup is a polyherbal medication which was developed as a remedy for alcohol dependence based on traditional knowledge. It is a known fact that the alcoholism is an addiction that affects the physical, mental and social health of an individual. Number of Ayurveda formulations like *Ashtangalavana*, *Guduchyadi yoga*, *Ashwagandharishta*, *Shreekhandasava* has been proved to be effective against the symptoms of alcohol use disorder.⁶⁻⁹

Even though the above clinical trials have shown a promising result, the treatment protocols are not applicable much, as it requires in patient care to carry out the procedures as specified by the research outcome. Further, few medications aim only at mental faculties whereas few formulations aim at hepatic damage. In some cases, the formulations are designed to curb the craving. Hence there was a need for generating a formulation with holistic approach of correcting the vitiation of the *Dosha* in all systems. Hence an approach towards overcoming the ill effects of alcoholism on both physical and mental faculties was thought of. With this aim, a compound formulation “*Sumukti* syrup” was designed.

This compound is prepared with drugs that are nootropic (*Medhya*), immunomodulators (*Rasayana*), carminative (*Deepaka*) and with hepatic stimulants (*Yakrituttejaka*) properties. The ingredients are *Kiratatikta* (*Swertia chirata*),

Draksha (Vitis vinifera), Katuki (Picrorhiza kurroa), Bhringaraja (Eclipta alba), Mandookaparni (Centella asiatica), Guduchi (Tinospora cordifolia), Hareetaki (Terminalia chebula), Vibhitaki (Terminalia bellerica), Amalaki (Emblica officinalis), Ashwagandha (Withania somnifera) and Yastimadhu (Glycyrrhiza glabra). Among them *Kiratatika, Draksha, Katuki and Bringaraja* are useful in hepatic disorders (*Yakritvikara*)¹⁰⁻²³. *Mandookaparni* and *Guduchi* are known nootropic (*Medhya*) drugs²⁴⁻²⁹. *Hareetaki, Vibhitaki* and *Amalaki* are selected for their ability to relieve the vitiation of body humors (*Dosha*).³⁰⁻³⁴ *Ashwagandha* and *Yastimadhu* are immunomodulators (*Rasayana*)³⁵⁻³⁸ in nature. Based on these factors the ingredients of *Sumukti syrup* were selected.

MATERIALS AND METHODS

Collection of raw drugs: The raw materials were procured from Sri Dharmasthala Manjunatheshwara Ayurveda Pharmacy (SDMAP) Udupi and Teaching Pharmacy of Sri Dharmasthala Manjunatheshwara College of Ayurveda (SDMCA) Hassan. Few ingredients like Sugar and *Draksha* were purchased from a provisional store in Hassan. The fresh drugs like *Guduchi, Bhringaraja* and *Mandukaparni* were collected from SDMCA Hassan herbal garden. (Table 1)

Authentication of the raw drugs: All the raw materials were tested and authenticated by Department of Dravyaguna SDMCA Hassan. The authentication was done based on morphological features, organoleptic features and with the help of standard herbarium specimen. The authentication was also done based on physico chemical parameters at Sri Dharmasthala

Manjunatheshwara Research Centre of Ayurveda and Allied Sciences (SDMCRAAS) Udupi.

Preparation of Sumukti Syrup

Preparation of decoction for Sumukti syrup: Ingredients SI no 1 to 11 were taken in the quantity as specified. The dry drugs (SI no 3-6 & 9 to 11) were converted to coarse powder by pounding. The wet drugs (SI no 1,2,7& 8) were cleaned and cut into smaller pieces. 200ltr of potable water (SI no 12) was added and kept on mild flame on a gas stove. Continuous stirring was done till it reduced to ¼ th quantity. It was then filtered with a clean cloth and measured. (Table 1)

Preparation of Sumukti syrup: The prepared kashaya was taken in a clean vessel. To that prescribed quantity of sugar (SI no 13) was added and kept on mild fire. It was continuously stirred till one thread consistency was obtained. After completion of heating process sodium benzoate was added as a preservative. (Table 1)

Analysis of Sumukti Syrup

The pharmacognostic evaluation of raw materials for identity purity and strength as well as physico-chemical parameters of finished product including HPTLC was also done following standard protocol specified by Department of AYUSH, Ministry of Health & Family welfare, Government of India³⁹ at SDMCRAAS Udupi.

Table 1: Ingredients and proportion of Sumukti syrup

SI No	Drug name	Latin name	Part used	Proportion
1	<i>Guduchi</i>	<i>Tinospora cordifolia</i>	Stem	400 g
2	<i>Bringaraja</i>	<i>Eclipta alba</i>	Whole plant	400 g
3	<i>Kiratatika</i>	<i>Swertia chirata</i>	Whole plant	800 g
4	<i>Amalaki</i>	<i>Emblica officinalis</i>	Fruit	400 g
5	<i>Hareetaki</i>	<i>Terminalia chebula</i>	Fruit	400 g
6	<i>Vibhitaki</i>	<i>Terminalia bellerica</i>	Fruit	400 g
7	<i>Draksha</i>	<i>Vitis vinifera</i>	Fruit	3200 g
8	<i>Mandukaparni</i>	<i>Centella asiatica</i>	Whole plant	400 g
9	<i>Ashwagandha</i>	<i>Withania somnifera</i>	Root	400 g
10	<i>Yashtimadhu</i>	<i>Glycyrrhiza glabra</i>	Stem	400 g
11	<i>Katuki</i>	<i>Picrorhiza kurroa</i>	Root	800 g
12	Water			200 liters
12	Sugar			50kg
13	Sodium benzoate	Preservative		250g

OBSERVATIONS AND RESULTS

Observations of pharmaceutical and analytical study are as shown in Table 2-6.



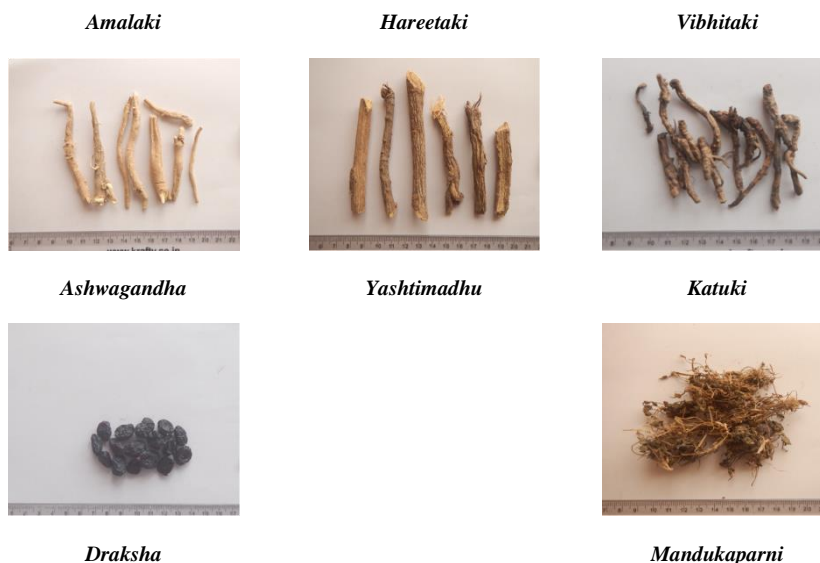


Figure 1: Raw materials of Sumukti syrup

Table 2: Observation of decoction for Sumukti syrup

Time	Temp in °C	Observations
8.30 am	30	<i>Kashaya dravyas</i> floating
10.30 am	90	Just started to boil
11.30 am	94	Boiling with bubbles
12.30 pm	96	All <i>dravyas</i> mildly sunk, vapours increased
1.30 pm	96	Boiling, colour of <i>Kashaya</i> brown
2.30 pm	96	Smell of <i>triphala</i> , <i>katuki</i> , <i>kiratatikta</i> felt
3.30 pm	96	Volume of water reduced, smell and colour same
4.30 pm	96	Dark brown colour <i>Kashaya</i> with strong smell of drugs, volume nearing to 1/4 th reduction
5.15 pm	96	Volume reached 1/4 th , boiling discontinued
6.30 pm	70	52 liters of dark brown <i>Kashaya</i> obtained

Table 3: Observation of Sumukti Syrup

Time	Temp in °C	Observations
8.00 am	30	Sugar added
10.00 am	52	Sugar partly dissolved
11.00 am	62	Sugar completely dissolved
11.30 pm	60	<i>Kashaya</i> filtered to remove physical impurities
12.00 pm	42	<i>Kashaya</i> kept for boiling again
2.00 pm	64	Syrup started to boil
3.00 pm	62	Became little viscous, colour dark brown
4.30 pm	64	Still more viscous, dark brown colour
5.40 pm	60	One thread consistency obtained, stopped boiling
9.30 am		57ltr of dark brown syrup obtained, viscous in nature

Table 4: Identity, Purity and Strength of Raw materials of Sumukti syrup

Samples	Parameters						
	Loss on Drying (%)	Total Ash (%)	Acid Insoluble Ash (%)	Water Soluble Ash (%)	Alcohol Soluble Extractive Value (%)	Water Soluble Extractive Value (%)	
<i>Guduchi</i>	9.71	8.125	0.099	6.075	2.375	21.079	
<i>Bringaraja</i>	8.24	22.550	4.400	11.300	4.662	23.619	
<i>Kiratatikta</i>	14.96	8.577	0.099	3.585	7.206	22.942	
<i>Amalaki</i>	10.279	3.436	0.398	2.689	19.94	47.238	
<i>Haritaki</i>	9.036	3.782	0.397	3.290	42.142	64.074	
<i>Vibhataki</i>	9.126	7.085	0.398	5.594	12.261	51.57	
<i>Yastimadhu</i>	15.913	6.252	0.593	1.593	7.384	22.098	
<i>Draksha</i>	6.06	2.753	0.099	2.281	41.504	89.321	
<i>MandukaParni</i>	6.297	22.96	9.661	3.8	2.423	12.123	
<i>Ashwagandha</i>	8.682	6.932	0.199	3.386	5.280	18.739	
<i>Katuki</i>	7.492	3.446	0.7	1.596	23.53	39.817	

Table 5: Physico-chemical parameters of *Sumukti* syrup

Parameters	Results n = 3 %w/w
Total Solids	7.95
Total Sugar	17.5
Reducing Sugar	6.19
Non Reducing Sugar	11.31
Specific gravity	1.4652
Refractive Index	1.4815

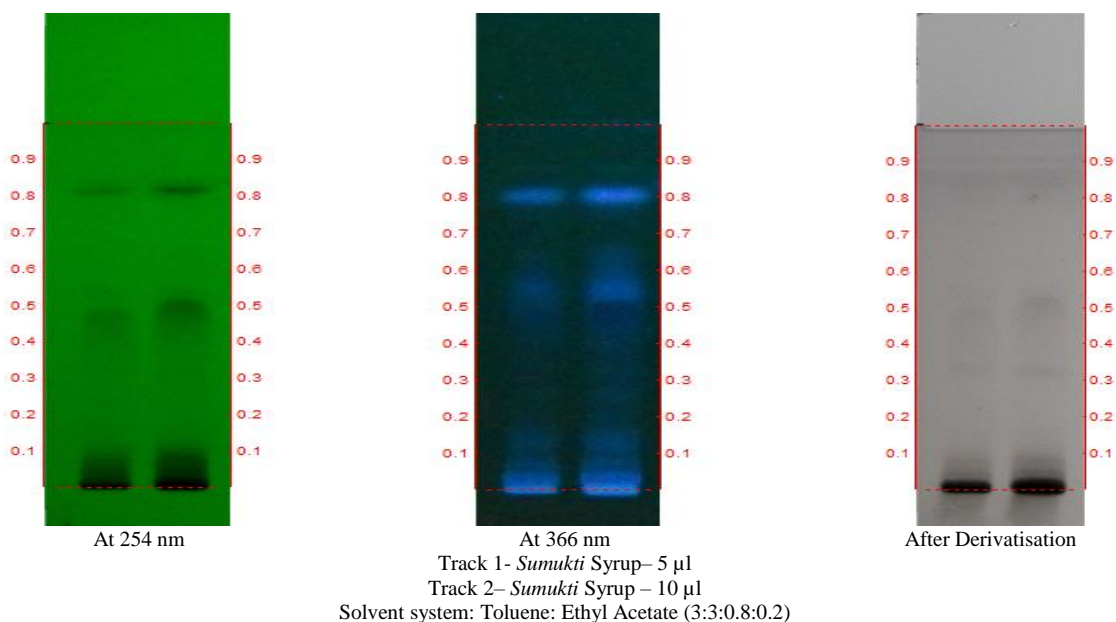


Figure 2: HPTLC photo documentation of Butanol extract of *Sumukti* Syrup

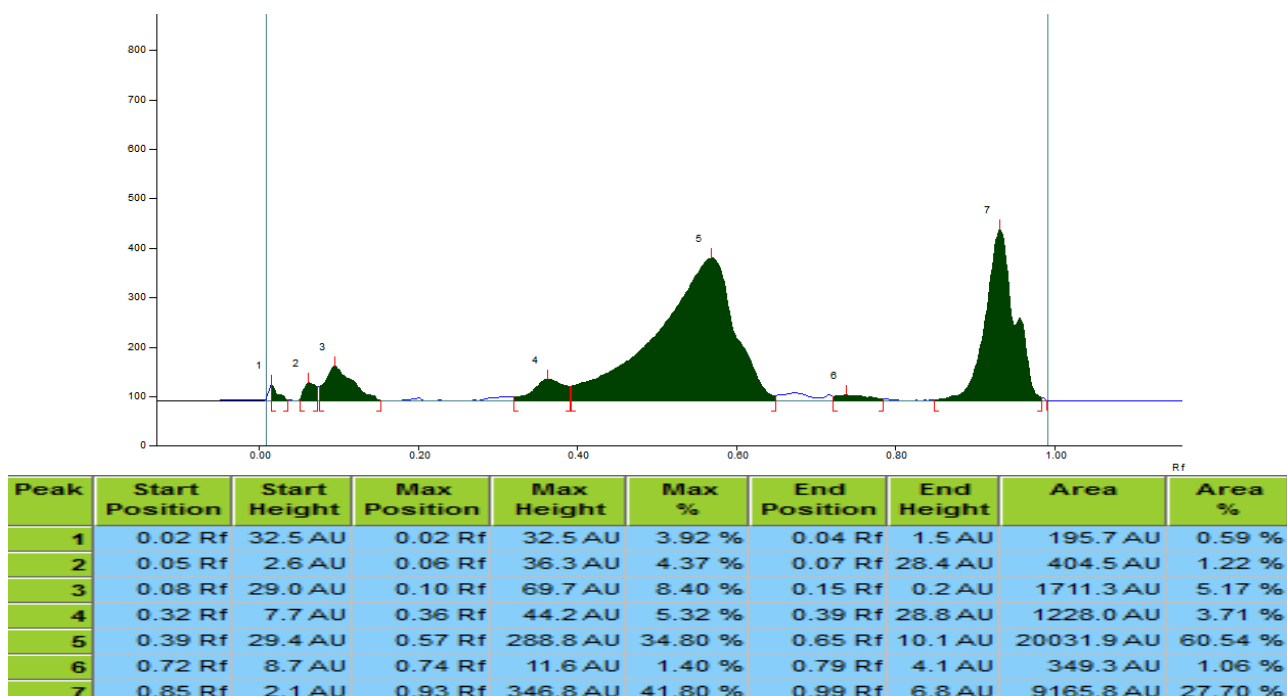
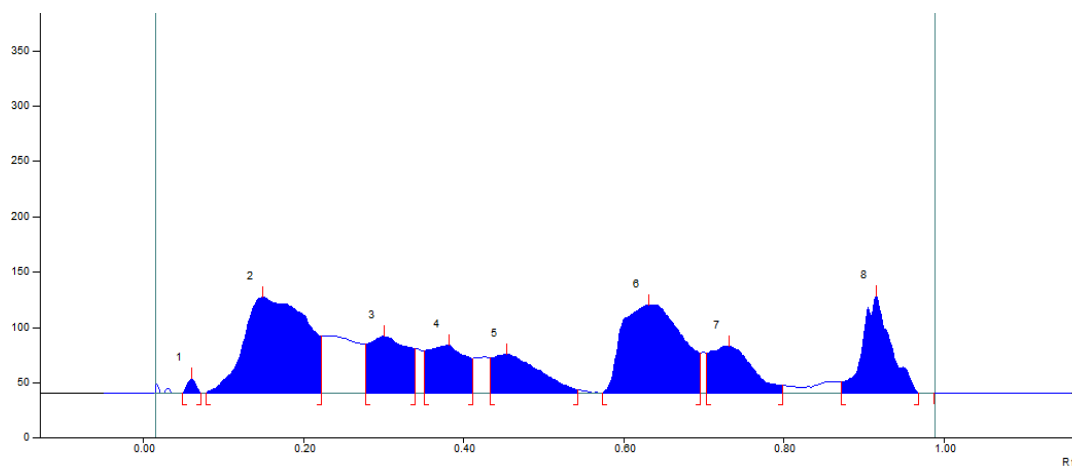
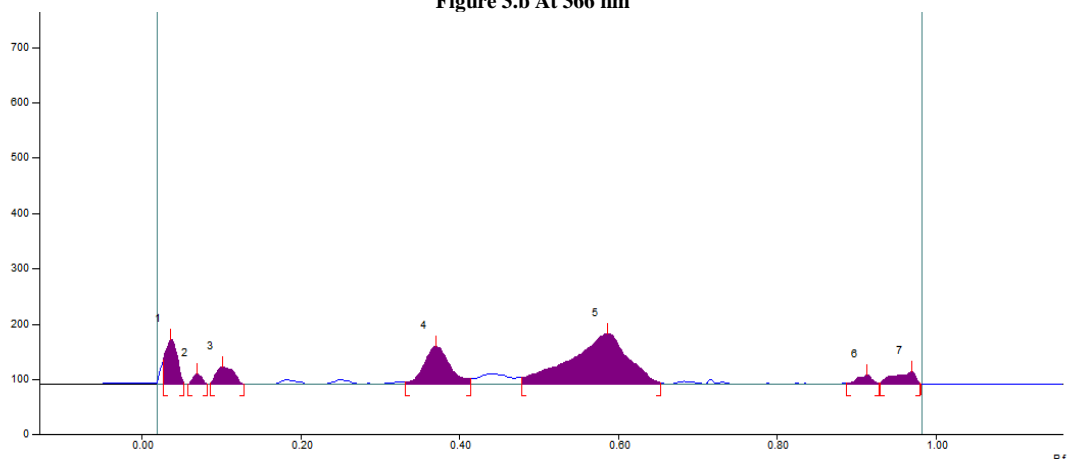


Figure 3. a At 254 nm



Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.05 Rf	0.2 AU	0.06 Rf	13.0 AU	2.95 %	0.07 Rf	0.1 AU	98.8 AU	0.55 %
2	0.08 Rf	0.2 AU	0.15 Rf	86.4 AU	19.64 %	0.22 Rf	51.9 AU	4868.8 AU	27.27 %
3	0.28 Rf	44.8 AU	0.30 Rf	51.3 AU	11.66 %	0.34 Rf	40.3 AU	1789.7 AU	10.03 %
4	0.35 Rf	38.7 AU	0.38 Rf	43.2 AU	9.82 %	0.41 Rf	31.3 AU	1499.0 AU	8.40 %
5	0.43 Rf	31.7 AU	0.45 Rf	35.3 AU	8.03 %	0.54 Rf	3.0 AU	1493.5 AU	8.37 %
6	0.57 Rf	0.1 AU	0.63 Rf	79.8 AU	18.14 %	0.70 Rf	36.5 AU	4287.7 AU	24.02 %
7	0.70 Rf	36.4 AU	0.73 Rf	42.8 AU	9.73 %	0.80 Rf	6.9 AU	1614.6 AU	9.04 %
8	0.87 Rf	9.9 AU	0.92 Rf	88.1 AU	20.03 %	0.97 Rf	0.3 AU	2199.4 AU	12.32 %

Figure 3.b At 366 nm



Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.03 Rf	43.5 AU	0.04 Rf	80.7 AU	24.51 %	0.05 Rf	2.3 AU	884.1 AU	10.38 %
2	0.06 Rf	0.0 AU	0.07 Rf	18.4 AU	5.57 %	0.08 Rf	0.6 AU	146.4 AU	1.72 %
3	0.09 Rf	1.5 AU	0.10 Rf	31.1 AU	9.45 %	0.13 Rf	0.0 AU	499.0 AU	5.86 %
4	0.33 Rf	3.9 AU	0.37 Rf	67.9 AU	20.61 %	0.41 Rf	10.4 AU	1594.6 AU	18.73 %
5	0.48 Rf	12.4 AU	0.59 Rf	91.1 AU	27.64 %	0.65 Rf	2.6 AU	4719.7 AU	55.43 %
6	0.89 Rf	1.2 AU	0.91 Rf	16.6 AU	5.05 %	0.93 Rf	2.7 AU	220.1 AU	2.59 %
7	0.93 Rf	3.0 AU	0.97 Rf	23.6 AU	7.16 %	0.98 Rf	2.6 AU	450.5 AU	5.29 %

Figure 3.c At 620 nm

Figure 3: Densitometric scan of Sumukti Syrup

Table 6: R_f values of the sample

At 254 nm	At 366 nm	After Derivatisation
0.05(L Green)	0.05(F Violet)	0.05(L Grey)
0.09(L Green)	0.09(F L Violet)	0.09(L Grey)
0.12(L Green)	0.12(F L Violet)	-
-	0.16(F L Violet)	-
-	0.22(F L Violet)	-
-	0.27(F L Violet)	-
-	0.32(F L Violet)	0.32(L Violet)
-	0.39(F L Violet)	0.39(L Violet)
-	0.44(F L Violet)	-
0.51(L Green)	0.51(F L Violet)	-
0.53(L Green)	-	0.53(L Violet)

-	0.56(F L Violet)	-
-	0.60(F L Violet)	-
-	0.63(F L Violet)	-
-	0.66(F L Violet)	-
0.81(L Green)	0.81(F Violet)	-
0.84(L Green)	-	-
-	0.88(F L Violet)	-

*L-Light, F-Fluorescence

DISCUSSION

Standardization is terminology that is usually indicative of a numerical value which is reproducible under similar set of subjects under study. Despite the initiation of recent technology in standardization of multipart formulations, not many *Ayurvedic* poly herbal or herbo-mineral medicines are standardized so far. Multiple ingredients with various phyto-constituents make the process more challenging. However it is need of hour to establish the standards for the benefit of consumers as well as for fulfilling the needs of evidence based science. In order to achieve the challenge from clinical researchers, the drugs have to undergo standardization and thus a scientific, valid answer is got through it, increasing faith in health seekers. The constituents that are selected for the formulation of *Sumukti* syrup are known for their hepatoprotective, anxiolytic and free radical scavenging activity. However such a combination is not being manufactured by any pharmaceutical company or references of this combination is not available any authoritative books of *Ayurveda*. So after several exercises on pre-formulation the authors have developed the combination of drugs in proposed ratio. The parameters observed during pharmaceutical and analytical works have been documented in this work which can be considered as preliminary characterization of raw drugs as well as formulation.

The raw materials collected from reliable sources were authenticated based on morphological characteristics. The identity purity and strength in terms of Total ash, Acid insoluble ash, water soluble extractive and alcohol soluble extractive of *Guduchi*⁴⁰, *Bringaraja*⁴¹, *Kiratatikta*⁴², *Amalaki*⁴³, *Haritaki*⁴⁴, *Vibhitaki*⁴⁵, *Draksha*⁴⁶, *Yashtimadhu*⁴⁷, *Ashwagandha*⁴⁸ and *Katuki*⁴⁹ used in this formulation were comparable with pharmacopeia standards. The analytical values of *Mandukaparni*⁵⁰ however did not match with pharmacopeia standards as far as Total ash and Acid insoluble ash are concerned. This may be because of increased inorganic components in area from where the fresh plant of *Mandukaparni* was collected.

In the preparation of decoction from herbal drugs for syrup it was observed that the temperature increased up to 94 °C in three hours and increased to 96°C in next one hour. The same was maintained for next 4 hours 45 minutes. The total time taken for dehydration of 150 liters of water during the preparation of decoction was 8.45 hours. During the preparation of syrup from decoction however the temperature raised to 60-64 °C range in three hours and the same was maintained for next 9.40 hours. This data can be considered as a relative time duration and temperature pattern for preparation of decoction and syrup for given quantity of water and sugar concentration.

Based on the ratio of ingredients that are included in the formulation of syrup, 47.1% of water and 45.35% of sugar is present in the syrup. The percentage of *Draksha* is 2.9%, *Katuki* & *kiratatikta* are in 0.73% and remaining ingredients are in 0.36%. However, the HPTLC photo documentation of *Sumukti* syrup showed 9 spots corresponding to *Guduchi*, 6 corresponding to *Amalaki*, 5 each of *Mandukaparni* and

Yashtimadhu, 4 each of *Vibhitaki* and *Bringaraja*, 3 each of *Katuki* and *Draksha*, 2 of *Kiratatikta* and 1 each of *Hareetaki* and *Ashwagandha*. This is suggestive of fractional isolation of phyto-constituents of raw materials added in the formulation. Heat stability and sensitivity of the phyto-constituents may be the other reason. Further ethanol extract media which was used as solvent system for preparation of test solution for HPTLC or sugar base present in the syrup could be the influencing factors.

CONCLUSION

Development of a new formulation is a challenge for a pharmacist or a physician. In the present study the authors have tried to develop a new formulation for alcohol dependency in syrup form. The herbal ingredients and proportion were carefully decided based on research data available on individual herbal drugs. The syrup from selected herbs was prepared as per the textual references from authoritative books of *Ayurveda*. The final product was analyzed using certain analytical parameters specified by Department of AYUSH, Ministry of Health & Family welfare, Government of India. The data obtained of this study can be considered as a preliminary standardization of the formulation under study.

ACKNOWLEDGEMENTS

Authors would like to acknowledge the research grants provided by Rajiv Gandhi University of Health Sciences, Karnataka Bangalore for present research work

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How to cite this article:

Govinda Sharma K et al. Pharmacognostic evaluation of an indigenous Ayurvedic polyherbal formulation: Sumukti syrup. J Pharm Sci Innov. 2018;7(5): 175-182.

<http://dx.doi.org/10.7897/2277-4572.075104>

Source of support: Rajiv Gandhi University of Health Sciences Karnataka, Bangalore Conflict of interest: None Declared

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