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Quality Control Parameters of *Mandukarni* Syrup - A classical memory enhancing dosage form

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ABSTRACT

Ayurveda is the healing medicine. *Dosha, Dhatu, Mala* and *Agni* play important role in maintaining health of a person, but without equilibrium of *Atma*, *Indriya* and *Manas* they are helpless. *Manas* is one entity which is the controller of health. There are several herbs which have direct impact on *Manas*, among them *Mandukaparni* is one. *Swarasa* of *Mandukaparni* is highly effective, but it is not easily available for children. This study is intended to make Syrup form of *Mandukaparni* and evaluate its pharmacognostical parameters. According to the methodology refractive index, total solids, specific gravity, reducing and non Reducing sugar and HPTLC parameters were assessed. The results were found to be genuine fulfilling the standard protocol. This study is under taken to evaluate the pharmacognostic properties of *Mandukaparni* syrup.

Key words: *Mandukaparni, Standardization, Syrup, HPTLC.*

INTRODUCTION

Ever since the evolution of mankind on this earth there has been a special relationship between life, disease and plants. Man is always reliable on plants either for food or medicine. Primitive people started using plants and found that majority of plants were suitable as food, whereas other were either poisonous or medicinally useful. Thus the knowledge of herbal remedies was transferred to generation and history of folklore began.

In Ayurveda several plants have been mentioned which have shown potential to improve the intelligence which are grouped as *Medhya Rasayana.*

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Acharya Charaka in his first chapter of *Chikitsasthana* has mentioned four *Medhya Rasayana* drugs, among them priority has been given to drugs like *Mandukparni, Yastimadhu, Guduchi* and *Shankhapushpi.*[1] In *Astanga Hridaya Uttarasthana*, *Rasayanavidhi Adhyaya* it is mentioned that regular intake of *Mandukaparni* fried in *Ghrita* acts as *Rasayana.*[2] In *Vangasena*, *Unmada Adhikara* it is told that, juice of *Mandukaparni* combined with equal quantity of that of *Dhattura* leaves and *Somavalli* leaves alleviates Insanity.[3] According to Indian Herbal Pharmacopeia, *Mandukaparni* is used in Indian Medicine as a brain tonic.[4] *Centella Asiatica* has neural dendrite growth stimulating property, which may help in enhancing concentration power, thus improving memory.

The medications given to children should differ in dose and palatability. Children usually prefer syrups over tablets. Syrups are concentrated solutions of sugar and medicinal drugs. Syrups can be compared with *Sharkara Kalpana* of Ayurvedic classics. In *Sangraha* period there is no reference about the *Sharkara Kalpana*. In modern period method of preparation is mentioned in *Dravyaguna Vijnyana*.

ISSN: 2456-3110 ORIGINAL ARTICLE July-Aug 2017

MATERIALS AND METHODS

Materials

The ingredients for formulation were procured from SDM Pharmacy, Udupi, Karnataka and *Mandukaparni* syrup was prepared. The methodology was carried as per Standards Ayurvedic Pharmacopia of India. According to the methodology refractive index, total solids, specific gravity, reducing and non reducing sugar and HPTLC parameters were assessed.

Methodology[6]

1. Refractive index

Placed a drop of water on the prism and adjusted the drive knob in such a way that the boundary line intersects the separatrix exactly at the centre. Noted the reading. Distilled water has a refractive index of 1.3325 at 25˚C. The difference between the reading and 1.3325 gives the error of the instrument. If the reading is less than 1.3325, the error is minus (-) then the correction is plus (+) if the reading is more, the error is plus (+) and the correction is minus (-). Refractive index of oil is determined using 1 drop of the sample. The correction if any should be applied to the measured reading to get the accurate refractive index. Refractive index of the test samples were measured at 28˚C.

2. Total solid

Transfer accurately weighed 50 g. of the sample to an evaporating china dish, which have been dried to a constant weight and evaporate to dryness on a water bath, then dry at 105°C for 3 hr. After cooling the dish containing the residue in desiccators for 30 min, weigh it immediately. The weight of residue should comply with the requirements stated under the individual monograph.

3. Specific gravity

Cleaned a specific gravity bottle by shaking with acetone and then with ether. Dried the bottle and noted the weight. Cooled the sample solution to room temperature. Carefully filled the specific gravity bottle with the test liquid, inserted the stopper and removed the surplus liquid. Noted the weight. Repeated the procedure using distilled water in place of sample solution.

4. Reducing and non reducing sugar

10 g. of sample was taken in a 250 ml volumetric flask and 200 ml of water was added. Slight excess solid basic Lead acetate was added to remove tannins and made up to the mark without disturbing the solution by adding water. Shake and filtered. Slight excess of solid sodium oxalate was added to remove excess of basic lead acetate, shake and filtered. This filtrate was used for the estimation of reducing sugar.

Reducing sugar: Take the sugar solution in a 50ml burette.

Preliminary titration: 10 ml of Fehling's solution was pipette into a 250ml conical flask, from the burette, 15 ml of the sugar solution was added. The liquid boiled on asbestos-covered gauze and further quantities of the sugar solution was added (1ml at a time) at 10 to 15 second intervals to the boiling liquid until the blue colour is nearly discharged. 3-5 drops of aqueous methylene blue solution (1%) was added and continued the titration until the indicator is completely decolourised.

Accurate titration: The titration repeated, before heating, almost all of the sugar solution required to effect reduction of copper added. Gently boiled for two minutes. 3-5 drops of methylene blue indicator was added and the titration was completed within a total boiling time of three minutes. At the end point all the blue colour should be discharged and the liquid should be red.

The proportions of the various sugars, equivalent to 10ml of fehling's solution are taken from the table.

Total sugar: 20ml of reducing sugar solution was taken and 10ml of Concentrated Hydrochloric acid added and kept it aside over night. Neutralized with approximately 1M Sodium hydroxide solution or with solid sodium carbonate and made up to 100ml in a volumetric flask. Determined the total sugar content by the titrimetric method described above. Repeat the experiment twice and take the average value. Hydrochloric acid added and kept it aside over night.

ISSN: 2456-3110 ORIGINAL ARTICLE July-Aug 2017

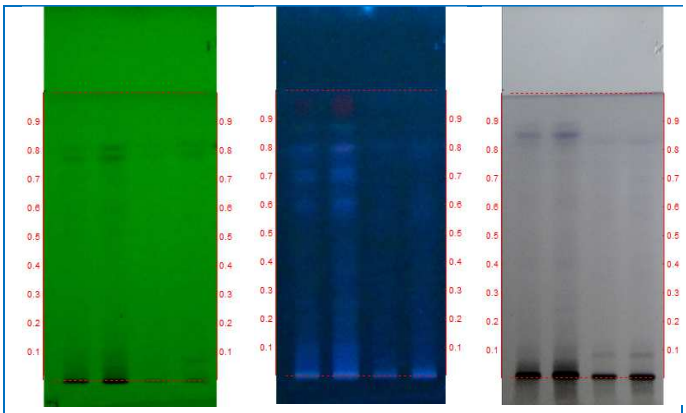
5. HPTLC[7]

1g. of Sample was extracted with 10ml of Butanol. 4 and 8µl of the above extract was applied on a pre-coated silica gel F_{254} on aluminum plates to a band width of 7mm using Linomat 5 TLC applicator. The plate was developed in Toluene : Ethyl Acetate (3:2:0.8:0.2). The developed plates were visualized in Short UV, Long UV, and then derivatised with vanillin sulphuric acid and scanned under Short UV and Long UV. R_f, colour of the spots and densitometric scan were recorded. (Table 2) (Figure 1)

Table 1: Quality standard parameters of *Mandukaparni* Syrup.

Parameter	Results n = 3 %w/w
	***Mandukaparni* Syrup**
Total Solids	43.261
Specific gravity	1.2391
Refractive Index	1.43867
Reducing sugar	8.449
Total Sugar	43.758

Figure 1: HPTLC photo documentation of Ethanol extract of *Mandukaparni* Syrup



At 254 nm **At 366 nm** **After Derivatisation**

Track 1 - Mandukaparni Syrup - 4 µl
Track 2 - Mandukaparni Syrup - 8 µl
Solvent system: Toluene: Ethyl Acetate (3:2:0.8:0.2)

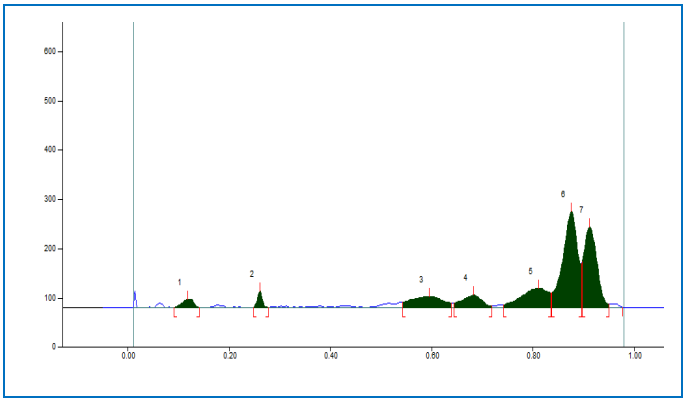
Table 2: Rf values of *Mandukaparni* syrup.

At 254 nm	At 366 nm	After Derivatisation
***Mandukaparni* Syrup**	***Mandukaparni* Syrup**	***Mandukaparni* Syrup**
0.03(L Green)	-	-
0.05(L Green)	0.05(F Violet)	-
-	-	0.06(Violet)
-	-	-
0.08(L Green)	-	-
-	-	-
-	-	0.10(L Violet)
	0.11(F Violet)	-
0.12(L Green)	-	-
-	-	-
-	0.15(F L Violet)	-
-	-	0.17(L Violet)
-	-	-
-	0.20(F Violet)	-
-	-	-
-	-	0.24(L Violet)
-	-	-
-	0.28(F Violet)	0.29(L Violet)
-	-	-
-	0.32(F L Violet)	-
0.33(L Green)	-	-
-	-	-
-	0.37(F L Violet)	-
-	-	-
-	-	0.41(L Violet)
-	-	-
-	-	-

ISSN: 2456-3110 ORIGINAL ARTICLE July-Aug 2017

-	0.47(F L Violet)	-
-	-	0.48(L Violet)
-	0.53(F L Violet)	-
-	-	-
-	-	-
0.59(L Green)	-	-
-	0.62(F L Violet)	-
-	-	0.63(L Violet)
-	-	-
-	0.65(F L Violet)	-
-	-	-
-	-	-
-	0.72(F L Violet)	-
-	-	0.75(L Violet)
0.78(L Green)	-	-
-	0.80(F Violet)	0.80(L Violet)
0.81(L Green)	-	-
-	-	-
-	-	0.86(Violet)
-	0.88(F Violet)	0.88(L Violet)
-	0.95(F L Red)	-
***L - Light, F - Fluorescence**		

Figure 2. Densitometric scan at Short UV



Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.09 Rf	0.1 AU	0.12 Rf	17.5 AU	3.52 %	0.14 Rf	0.2 AU	288.6 AU	2.63 %
2	0.25 Rf	0.4 AU	0.26 Rf	33.0 AU	6.65 %	0.28 Rf	0.5 AU	241.3 AU	2.20 %
3	0.54 Rf	11.3 AU	0.60 Rf	22.9 AU	4.60 %	0.64 Rf	9.6 AU	1048.4 AU	9.55 %
4	0.65 Rf	9.8 AU	0.68 Rf	25.9 AU	5.20 %	0.72 Rf	2.8 AU	714.8 AU	6.51 %
5	0.74 Rf	5.6 AU	0.81 Rf	39.5 AU	7.94 %	0.84 Rf	30.2 AU	1535.4 AU	13.99 %
6	0.84 Rf	30.7 AU	0.88 Rf	194.5 AU	39.12 %	0.90 Rf	89.2 AU	4120.6 AU	37.55 %
7	0.90 Rf	92.9 AU	0.91 Rf	163.9 AU	32.97 %	0.95 Rf	7.2 AU	3024.6 AU	27.56 %

DISCUSSION

Specific gravity is defined as the weight of a given volume of the liquid compared with the weight of an equal volume of water at the same temperature. Specific gravity of *Mandukaparni* Syrup was 1.2391gm/dl. Higher specific gravity implies higher concentration of solutes from raw drug.

Total solids indicate the amount of active constituents present in the sample, extractable in aqueous media. Total solids count of this syrup was 43.261% indicating a thick mixture having drug and sugar syrup in soluble form.

The index of refraction of a substance is the ratio of the velocity of light in a vacuum to its velocity in the substance. This, in turn, is dependent on composition, concentration and temperature of the substance. The method is applicable to syrup including those containing high fructose, maltodextrin solutions and dextrose and sucrose solutions. Refractive Index of test syrup was 1.43867 thus indicating syrup of herbal drug in soluble form.

Total sugar is a measure of carbohydrate present in the formulation. As this test syrup is a sugar based syrup has given a value of 40%. Reducing sugar indicates the presence of monsacharide compounds or aldehyde group. *Mandukaparni* syrup has shown a value of 43.758 measure of its reducing sugar, thus a less amount of monosacharides in this mixture.

CONCLUSION

Mandukaparni syrup has been standardized according to the pharmacopeial methodology. The data obtained in the present investigation ensures quality and safety of drug. The main action of *Mandukaparni* is adaptogenic, central nervous system relaxant, peripheral vasodilator, sedative and antibiotic.[8] Therefore *Mandukaparni* syrup can be safely administered to pediatric age group as a brain tonic

ISSN: 2456-3110 **ORIGINAL ARTICLE** July-Aug 2017

for improving memory and for overcoming mental confusion, stress and fatigue.

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