An Analytical Study of Badama Paka

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Abstract: Many of formulations are distinctly mentioned in different ayurvedic literatures for specific conditions in unique. Badama Paka is one important formulation suggested in general debility. But its better marketing and world-wide acceptance needs its quality assurance by means of safety and efficacy. Nutrient values like electrolytes, vitamins viz., A and E are important portions of formulation which may add to special status in uses of different systems including nervous, circular and muscular. Good percentage of protein and sugar suggests importance of formulation in general debility. Protein is cellular building block while sugars works as energy source.

Keywords: Badama Paka, Vitamin, Protein, Sugar .....

Badama Paka is a herbo-mineral preparation, used to improve stamina and general debility. Its reference under Vajeekarana suggests about the uses of formulation in improving the virility, fertility and power of a person. Being Badam as main ingredients its impacts as brain tonic is well marked. To ensure the safety and efficacy of any such products like Badam Paka, it is essential to analyze the raw materials and finished products properly with the needed purpose in terms of suggested uses. World Health Organization and Ayurvedic Pharmacopoeia of India have mentioned the norms and procedures to follow at minimal scale for any such drug or formulation.

Materials and Methods: Collection of Ingredients: Badam and Keshar were collected from Delhi market. Sita, Gritha, Ela, Brihad Ela, Jatiphala, Lavanga and Twak were collected from the market of Koppa. Pista and Chironji were collected from market of Shimoga. Swarna vark and Rajatha vark were collected from Mugrai Brothers, Punjab market.

Genuine Status Testing: The drugs were identified pharmacognostically based on characters mentioned with *Ayurvedic Pharmacopoeia of India*, *Textbook of Pharmacognosy*, *Quality Standards Indian Medicinal Plants* etc[1,2,3,4,5,,6,7,8,9,10,11]. Once identity was assured, then further processing was done.

Preparation of Formulation: The collected drugs (except Swarna vark and Rajatha vark) were kept in side air tight container to avoid the dust and foreign particles. They were regularly attended to check any fungal infestation. Such infection was not observed. After that, these drugs were brought to Churna (powder) form (except Badam, Sita, Ghrita, Chironji). Machines and materials used in powdering and soaking were cleaned thrice to avoid any contamination. To attain the sukshma churna mentioned with classical texts[12], powder of each drug was passed through sieve number 125 and sieve number 75[13]. The sukshma churna was used for Avaleha preparation. For phytochemical analysis, fine powder was used. Fine powder was passed through sieve number 125/75[12].

For preparation for formulation (reference: Bharata Bhaisajya Ratnakar)[14], ½ prasta of Badam was taken in water till they were sunk. Next day morning Badam was decorticated (outer coverings were removed). After decortication, it was crushed with grinder (Bajaj GX-3). Crushed material was taken in pot with 2 pala molten ghrita and was fried at mandagni (mild fire). On other side 1 prasta Sita was used to prepare Sharkara paka of 3-4 threads consistency. Once 3-4 threads consistency was achieved, it was added with fried Badam paste and boiling was continued to attain siddhi lakshanas. On accomplishing the siddhi lakshana, it was removed from fire and 1 karsha each of Ela, Brihad ela, Jatiphala, Lavanga, Keshar and Twak were added. They were further added with 1 pala each of Pista

and Chironji. All ingredients were mixed well to make homogenous mixture. Then 100 pieces each of Swarna vark and Rajat vark were added. Now modakas were prepared from this mixture. These all procedure were done in the Pharmacy attached to Dept. of PG studies in Bhaishajya Kalpana of A.L.N. Rao Memorial Ayurvedic College, Koppa.

Chemical Analysis: Comeplete chemical analysis was done in Quality Control Laboratories, of A.L.N. Rao Memorial Ayurvedic College, Koppa. The Physico-chemical parameters were assessed with standard procedures[1,2,3,4,5,,6,7,8,9,10,11] given with WHO's quality control procedures and pharmcopoeia. The parameters included loss on drying, total ash, acid insoluble ash, water soluble ash, alcohol soluble extractives and water soluble extractives. Preliminary phytochemical tests were done for carbohydrate, protein, alkaloid, cardiac glycosides, flavonoids and tannin. Quantitative estimation of heavy metals were done to assure the formulation under maximum permissible limits given by WHO and Pharmacopoeia[13, 14, 15].

Quantitative estimation:

a. Total Fat[16]: 10 gm of material was taken 200 ml of petroleum ether (40-60^{0}C) in Soxhlet apparatus at 50^{0}C for 12 hours. Then it was dried over anhydrous sodium sulphate at 40^{0}C. Weight of oil was determined with reference to the weight of material used.

b. Protein Estimation[17]: 10 gm of Badam Paka was taken with distilled water. It was centrifuged at 2000 rpm for 15 minutes, and then supernatant was collected. It was diluted to 1 liter. All supernatants were mixed. For standard, 1 gm of protein powder of Leochem was mixed with 1 liter of distilled water. From this mg/10 mL solution of 1, 2, 3, 4, 5, and 6 were prepared. They were added with 2.5 mL of biuret reagent. In another test-tube, 0.1 mL of drug sample was mixed with 2mg/ 10 mL of standard and then it was added with 2.5 mL of reagent. Now absorbance was read on 550 nm using systronic 106 spectophotometer. From calibration curve of standard, concentration of sample was measured.

c. Total Sugar[18]: 10 gm of material was dissolved with 80% ethanol for 24 hrs as cold extraction. Next day, it was centrifuged at 2000 rpm for 15 minutes and supernatants were collected. All supernatants were mixed and evaporated. Now it was dissolved in 5mL of water and was brought to 100 mL with 2.5N HCl. It was allowed to hydrolyze on water-bath for 3 hours. After hydrolysis, it was dissolved to make 1 Liter solution. 10 mL of this was taken and dissolved to make 100 mL with distilled water.

For standard solution 100 mg of glucose (Merck) was dissolved in 1 Liter of distilled water. 10 mL of this was taken to make 100 mL with distilled water. From this standard containing 0.01, 0.02, 0.04, 0.06, 0.08 and 0.1 mg/mL were prepared. 1 ml of standard (with distilled water for specified concentration) and 1 mL of material was taken in separate test-tubes. They were added with 1 mL of 5% phenol solution followed by 5 mL of concentrated sulphuric acid. They were mixed well and absorbance was noted at 490 nm using systronic 106 spectophotometer.

d. Iron Estimation[19]: 0.290 gm of anhydrous ferric chloride was dissolved in 1 liter of water. 100 mL of this solution was taken. From this stock solution, standard solutions of 0.01 mg/mL, 0.02 mg/mL, 0.03 mg/mL, 0.04 mg/mL, and 0.05 mg/mL were prepared.

Another side, 10 gm of drug was incinerated at 450°C to convert in ash. Now it was dissolved with 2 mL of nitric acid followed by 8 mL of HCl. It was filtered. Now with filtrate, the solution was brought to 1 liter using distilled

water. 1 mL of each standard and drug sample solution, 0.2 mL ammonium thiocyanate solution (1 mol/Liter) was added. They were left for sometimes after mixing to develop permanent red colour. Once red colour appeared permamently, absorbance was noted at 490 nm. Calibration curve was drawn for standard solutions and from calibration curve, concentration of iron was measured in drug sample.

e.Vitamin A Estimation[20]: Trichloroacetic Acid Reagent (TCA) reagent was prepared by dissolving 30% TCA in chloroform. Dichloro-2-Propanol (1, 3-DCP) was activated with 1-2% antimony trichloride ($SbCl_3$).

About 10 mg of all-trans vitamin A acetate were weighed. They were dissolved in 100 ml of chloroform. 10 mL of this was taken and was dissolved to 100 mL chloroform solution. Again 10 mL of this was further diluted to 100 mL of chloroform to make 1 ppm solution. For Blank 1 ml of chloroform was added with 1 mL trichloroacetic acid followed by 1 mL DCP.

100 gm material was taken with petroleum ether. Petroleum ether extract was obtained. Extract was mixed with 10mL of chloroform. 1 mL of this was added with 1 mL of TCA and 1 mL of DCP. Now absorbance was noted at 620 nm for each standard and drug sample and from calibration curve of standard, concentration of iron in drug was determined.

f. Vitamin E Estimation[21]: Plant material for analysis was prepared in same way as was done for Vitamin A. 1 mL of the analysed fluid was taken into the test-tube. It was added with 0.25 ml solution of batophenanthroline followed by 0.25 ml of $FeCl_3$ solution and 0.25 ml of H_3PO_4 solution. They were mixed well and solution was ready for absorbance reading.

For standard solution, tocopherol acetate was used to prepare solution having 0.01, 0.02, 0.03, 0.04 and 0.05 mg/mL of tocopherol in petroleum acetate. Same way, it was added with batophenathroline, $FeCl_3$ and H_3PO_4 as done for plant material. Absorbance was noted at 540 nm. From the standard calibration curve, quantity of Vitamin E in sample was estimated.

g. Estimation of the Concentration of elements (Calcium, Sodium, Potassium) in Badam Paka by Flame photometer at different stages[27]: Systronic 128 and FPM Compressor 126 Flame Photometer was used. 1000 ppm of standard solutions was prepared by sodium chloride, potassium hydroxide and calcium chloride. Sodium and Potassium were prepared for calibration at concentration of 80 ppm, 60ppm, 40ppm and 20ppm while calcium was prepared with concentration 80ppm, 60 ppm and 40 ppm. After calibration, the solution containing different concentrations of sodium chloride, potassium chloride and calcium were introduced to find the intensity of the emitted light of each solution. A calibration graph between concentration and intensity of the solutions were drawn for each case. Finally the samples were brought to find out the intensity of emitted radiation. From the intensity displayed with screen, the concentration of calcium, sodium and potassium were determined. For preparation of sample, 10 gm of material was converted to ash at temperature 450°C. Now to this, 5 ml HNO_3 was added and was refluxed for 15 minutes. Now it was dissolved to 50 ml. By this solution estimation was done. The calculation was done by using Microsoft excel making calibration curve.

Thin Layer Chromatography: It was done using Toluene and Ethyl acetate in ratio of 93:7 as solvent system and anisaldehyde sulphuric acid as spraying agent.

Result:

Loss on Drying at 110°C	: 6.15%
Total Ash	: 3.15%
Acid Insoluble Ash	: 0.75%
Water Soluble Ash	: 0.80%
Water Soluble Extractives	: 8.80 %
Alcohol Soluble Extractives	: 51.30 %

Preliminary Phytochemical Tests:

Metabolites	Present/Absent	Intensity
Carbohydrates	Present	+++
Protein	Present	++
Alkaloids	Present	++
Cardiac glycosides	Present	++
Flavonoids	Present	+++
Tannin	Present	+++

Quantitative estimation:

Heavy metals	Quantity (in mg/Kg)
Mercury	0.002
Arsenic	0.10
Lead	0.38
Cadmium	0.05

a. Total Fat: 19.5%

b. Total Protein: 13.25%

c. Total Sugar: 34.87%

Chart Number: 1: Showing Calibration Curve of Standard of Protein

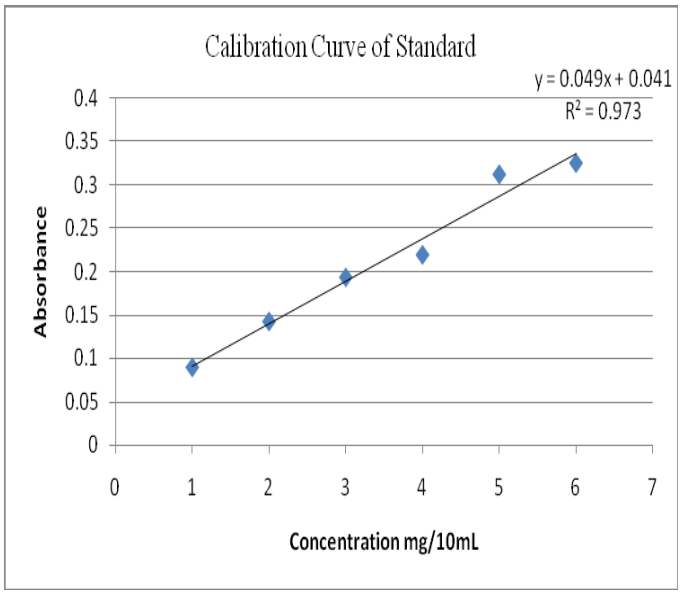
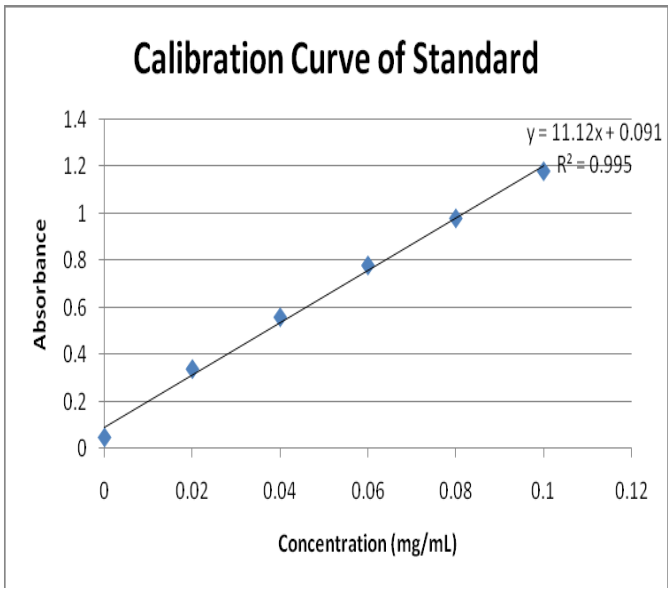
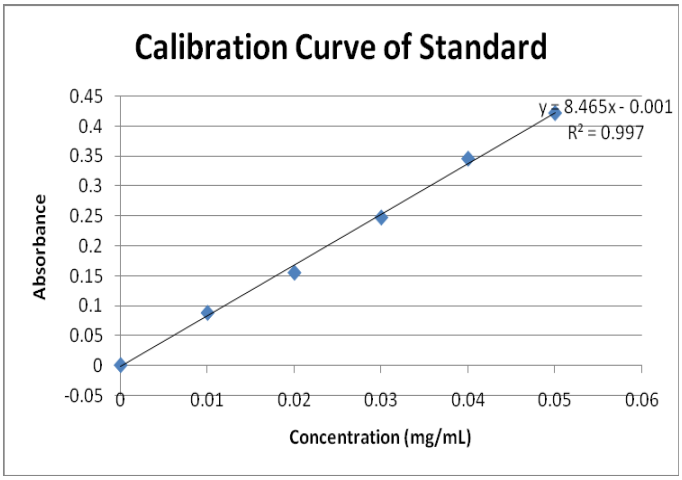


Chart Number: 2: Showing Calibration Curve of Standard of Sugar



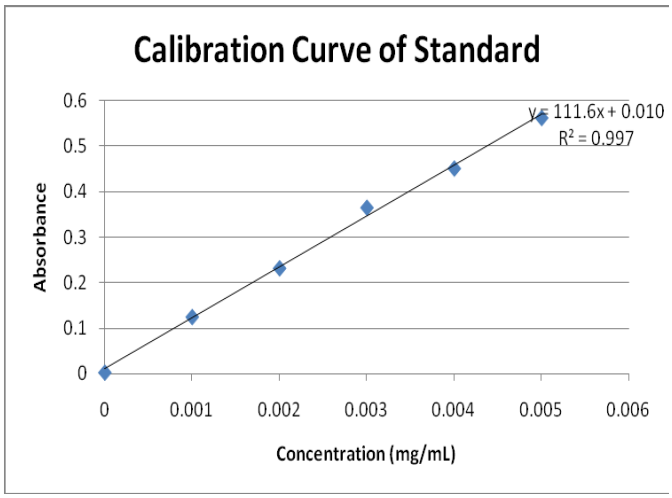
d. Total Iron: 2.55 mg/10gm

Chart Number: 3: Showing Calibration Curve of Standard of Iron



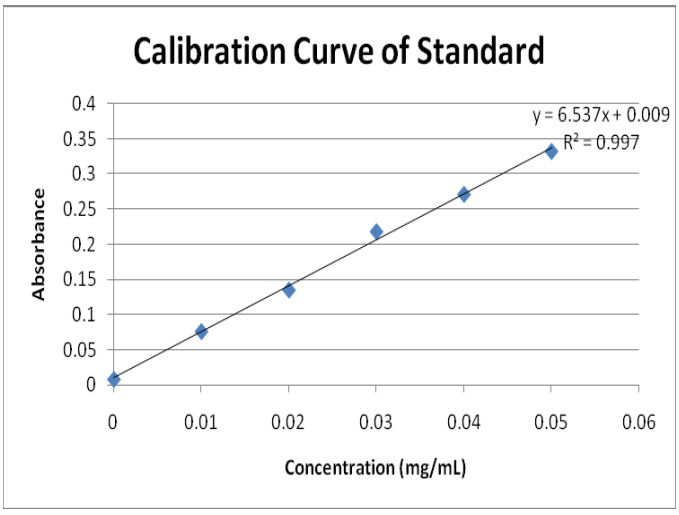
e. Vitamin A: 0.603342 mg/100gm

Chart Number: 4: Showing Calibration Curve of Standard of Vitamin A



f. Vitamin E: 16.06 mg/100 gm

Chart Number: 5: Showing Calibration Curve of Standard of Vitamin E



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A Randomized Control Clinical Evaluation of Trishyunadi Loha in Sthaulya Vis-a-vis Obesity

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(Continued from previous edition.....)

Table Number: 3: Showing Mean ± SD of Waist To Heap (WHR) Ratio of Trishyunadi loha and Placebo Groups

	Trishyunadi loha		Placebo
At the time of admission	0.89 ± 0.018	No Sig,	0.89 ± 0.017
On 30th Day	0.87 ± 0.014	No Sig.	0.88 ± 0.015
On 45th Day	0.86 ± 0.007	Sig.	0.88 ± 0.015
On 60th Day	0.84 ± 0.007	Sig.	0.88 ± 0.012

Discussion: The effect of Trishyunadi loha in comparison to placebo exhibited significant result in terms of BMI and WHR when assessed on both on 45th and 60th days. The result was not significant after completion of one month. From the result it is statistically shown that Trishyunadi loha works on weight loss by better consumption from accumulated fats. The effects may be attributed to Karshana, Lekhana, Shoshana etc.

Taken formulation is rich in iron contents other than terpene derivaties which are having capacity to bring the contents to inside cells. More potassium intake may initiate better diuresis initiating cleanising processes. It also helps to reduce the inflammation. Data from the American National Health and Nutrition Examination Survey III shows that the prevalence of iron deficiency increases as BMI increases from normal. Hence, Trishyunadi loha not helps to reduce the inflammation after obesity but also supplements the iron to avoid deficiency. It may release the suppressed hepicidin and replenish the iron store in adipose tissues.

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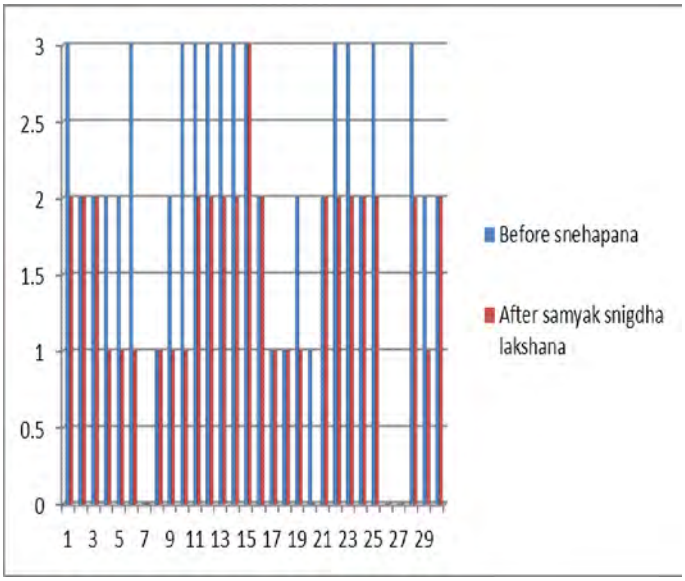
Appearance	Score
a. Light coloured discolouration with/ or covering less than 1 square inch area.	1
b. Moderate discolouration with/ or appro -ximately involving 1 square inch area.	2
c. Dark discolouration with/ or approximate -ly involving more than 1 square inch area	3

Chart Number:3: Showing telangiectasia documented in score pattern from 1 to 3



Descriptive Statistics

	N	Mean	S.D.	Min.	Max.
Before snehapana	30	2.0667	0.98027	0.00	3.00
After smayak snigdha lakshana	30	1.4333	0.77385	0.00	3.00

Ranks

		N	Mean Rank	Sum of Ranks
After smayak snigdha laksh -ana - Before snehapana	Negative Ranks	17[a]	9.00	153.00
	Positive Ranks	0[b]	0.00	0.00
	Ties	13[c]		
	Total	30		

a. After smayak snigdha lakshana < Before snehapana
b. After smayak snigdha lakshana > Before snehapana
c. After smayak snigdha lakshana = Before snehapana
Significance: <0.05

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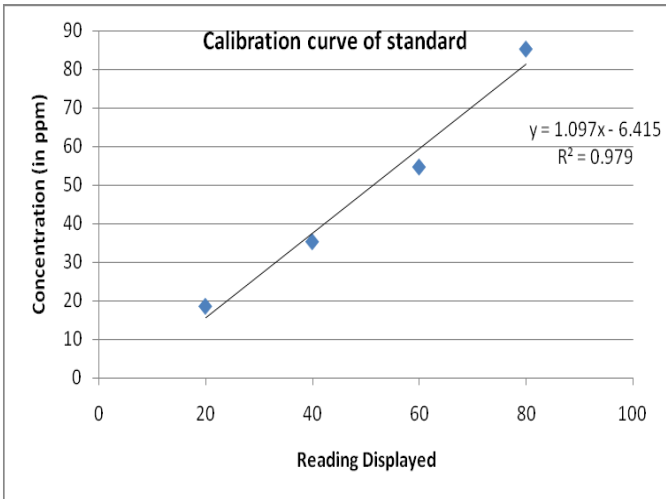
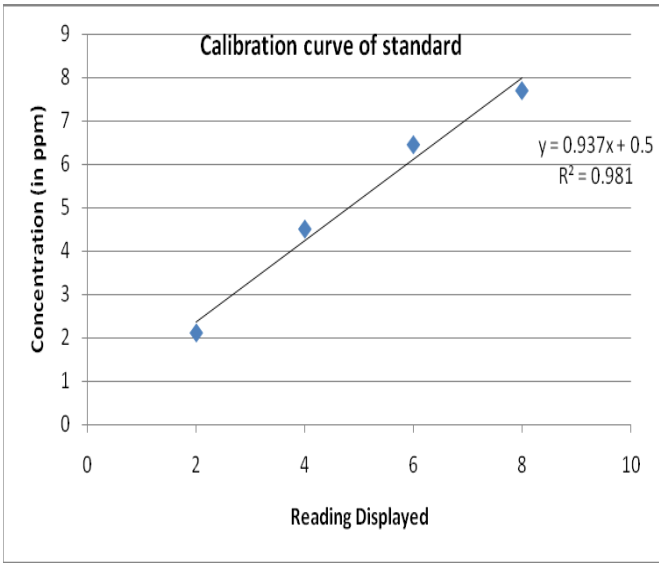
g. Calcium: 24.38 mg/10 gm

Chart Number: 6: Showing Calibration Curve of Standard of Calcium



h. Sodium: 1.73 mg/10 gm

Chart Number: 7: Showing Calibration Curve of Standard of Sodium



i. Potassium: 65.91 mg/10g

Chart Number: 8: Showing Calibration Curve of Standard of Potassium

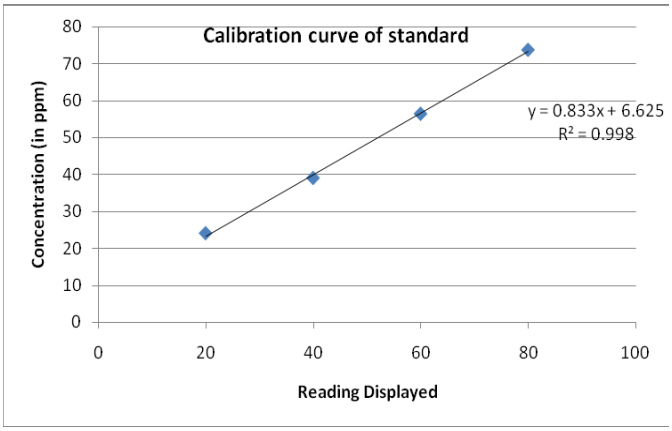
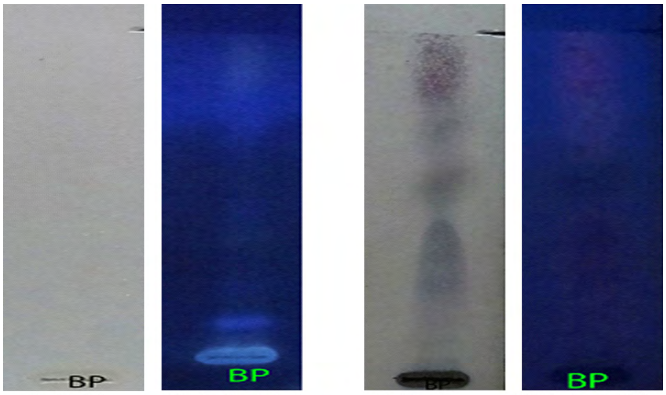


Plate: Showing Thin Layer Chromatography



Discussion: Among the result of physico-chemical parameters, alcohol soluble extractive values reveal high percentage, which might be due to greart fatty acid percentage as it was shown to 19.5%. Other than fats, protein and sugar percentage are also too high. Preliminary phytochemical tests exhibit flavonoids, alkaloids etc. Quantitative estimation of heavy metals shows the quantity under maximum permissible limit i.e., too low and safe to use. Good amount of Vitamins and electrolytes shows the probable action of drug through nervous system.

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