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Original Article

PHYSICO-CHEMICAL EVALUATION AND HPTLC FINGER PRINT OF SIDDHA POLY HERBAL FORMULATION "*SWASA KUDORI MATHIRAI*"

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ABSTRACT

Objective: The main objective of this research paper is to evaluate the physico-chemical properties and HPTLC finger print profile of *Swasa Kudori Mathirai* in the midst of various siddha polyherbal formulations.

Methods: *Swasa Kudori Mathirai* was prepared by the standard operative procedure. It was investigated for physico-chemical properties and HPTLC finger print profile by authenticated methods.

Results: The values of loss on Drying at 105°C / moisture content, pH were calculated as 6.52%,5.67 respectively. Total ash, Acid insoluble Ash, Water soluble ash values were found to be 9.81%, 2.24%, 7.38% respectively. Sieve analysis revealed that 24.05%, 31.60%, 34.90% retained in 300 µm,150 µm,75 µm sieves respectively. Uniformity of weight was within the acceptable range. Friability, Hardness, Distintegration Time were found to be 0.2142%, 0.5Kg/cm^2, 2 minutes 45 seconds respectively. Bulk density, Tapped density, Angle of repose, Hausner 's ratio, carr index was found to be 0.50 gm/ml,0.61 gm/ml, 34.21º,18.17%, 1.22 respectively. HPTLC finger printing revealed 4,5,7,8,9,8,8,8,6,6 phytoconstituents for the extract ranging from 1-10 µl respectively.

Conclusion: The results obtained from this study will be a reference data for further research and standardization of siddha formulations in perspective days.

Keywords: Siddha, Polyherbal formulation, Physico- chemical properties, HPTLC, Vali, Azhal, Iyyam.

INTRODUCTION

In the present scenario traditional system of medicine flourishing as a key factor in healthcare systems. Siddha system of medicine is one of the traditional System of medicine based on three humours Vali, Azhal, Iyyam. Therapeutic aspect of Siddha medicine consists of herbal, mineral, animal and marine components. Siddha system deals with diseases, treatment, prevention, cure and lifestyle.

The world health organization (WHO) defines traditional medicine as: "the health practices, approaches, knowledge and beliefs incorporating plant, animal and mineral-based medicines, spiritual therapies, manual techniques and exercises, applied singularly or in combination to treat, diagnose and prevent illnesses or maintain well- being[1]. Despite the tremendous advances in modern medicine, almost 80% of the people in rural areas of many countries resort to some kind of traditional medicine for their health-care needs [2]. This predicts traditional system of medicine is thriving and competes with the recent systems of medicine. If Siddha formulations have to be considered as rational drugs there must be standardization and reproducibility of therapeutic efficacy. One of the impedance in the up-coming Siddha system is lacking of pharmacokinetics and pharmacodynamics. Although many Siddha formulations mentioned in the literature have witnessed for the treatment for various diseases, there is striving for global acceptance due to lack of scientific validation and documentation. To overcome the limitations and ensure the quality, safety and therapeutic efficacy modern methods can be incorporated.

Swasa Kudori Mathirai [3] is one of the polyherbal formulation mentioned in Siddha text for the management of Bronchial Asthma. *Swasa Kudori Mathirai* comprises of *Piper nigrum* and *Calotropis gigantea*. It is one among the most commonly and widely used medicine by Siddha practitioners and Government Siddha hospitals and it is being used for many years. The formulation has ever subjected for scientific assessment and documentation except preliminary phytochemical screening and antimicrobial studies [4].

Inspite of accepting traditional medicine in some countries, validated analytical methods have to be implemented for products being prepared for worldwide recognition. Hence the present study marched towards the scientific validation. In this study, this formulation was evaluated for its physico- chemical properties and HPTLC finger printing.

MATERIALS AND METHODS

The ingredients of *Swasa Kudori Mathirai* are *Piper nigrum* and *Calotropis gigantea*. *Piper nigrum* was procured from raw drug store in Chennai. Flowers of *Calotropis gigantea* were collected in areas of Tambaram sanatorium. Both were authenticated by the competent authority.

Preparation of *swasa kudori mathirai* [3]

Piper nigrum and the flowers of *Calotropis gigantea* were taken in equal quantity. *Piper nigrum* was powdered and ground with the flowers of *Calotropis gigantea* then made in to mathirai of 130 mg.

Physico-chemical properties

Loss on drying at 105 °C /Moisture content [5]

This parameter was determined by moisture balance method. A sample of 5 g was accurately weighed, and the material was spread homogeneously on dishes provided with the instrument. The dishes were placed in the instrument and the instrument was adjusted accordingly at zero, temperature was set at 105° c. When the reading became constant in the circular scale for 15 minutes the readings had been taken. The percentage loss was directly determined.

pH (10% w/v solution) [6]

The pH of a given solution can be measured with the help of an apparatus called pH meter, consists of a voltmeter connected with two electrodes comprising of standard electrode of known potential and a special electrodes(the probe)enclosed in a glass membrane

that allows migration of H+ ions. The glass case contained a reference solution of dilute hydrochloric acid.

The two electrodes were dipped in the sample solution to be tested. Since the sample solution had a different pH from the solution in the probe, an electrical potential resulted. Thus, the potential between the standard electrode and the glass electrode varied with the pH of the solution under test. This potential was recorded by an inbuilt potentiometer of PH meter. The potentiometer reading was automatically converted electrically to a direct reading of the pH of the sample solution.

Determination of ash values [7]

Total ash

4 g of the sample was accurately weighed, powdered, incinerated and ground in a tared silica dish. The crucible was kept in a muffle–furnace at a temperature not exceeding 600°c until free from carbon (white ash). Then it was cooled and weighed until it was white, indicating the absence of carbon. The material was cooled in a desiccator and weighed. The content of total ash was calculated in mg/g of air-dried material. The percentage of total ash was calculated with reference to the air-dried drug.

Acid-insoluble ash

The total ash obtained was placed in a 250 ml beaker without loss of ash and 100 ml of dilute hydrochloric acid was added. The crucible was washed with 10 ml of acid and the washings of the beaker were transferred. The beaker was heated till the liquid was boiled. The solution was filtered and the insoluble matter was collected on an ashless filter paper (What man no, 41) and washed with hot water until the filtrate was neutral.

The insoluble matter left on the filter paper was transferred to the original crucible and dried on a hot plate, ignited at 600° c in a muffle furnace (until it became white ash). The residue was allowed to cool in suitable desiccators for 30 minutes and was weighed without delay. The process was repeated until the constant weight was obtained. The acid insoluble ash was calculated with reference to the air dried drug.

Water soluble ash

The total ash obtained was boiled for 5 minutes with 25 ml of water. The insoluble matter was collected in a Gooch crucible. Then the insoluble ash was washed with hot water and ignited for 15 minutes at a temperature not exceeding 600 °c. The weight of the insoluble matter was subtracted from the weight of the ash, The difference in weight represented the water-soluble ash. The percentage of water-soluble ash was calculated with reference to the air-dried drug.

Particle size [8]

A sample of 25g was placed in a sieve of suitable nominal mesh aperture. The sieve was shaked for not less than 30 minutes in a rotator horizontal direction and vertically by tapping on a hard surface. The amount remaining on the sieve was accurately weighed in the receiving pan. Prolonged shaking was avoided that would result in increasing the fineness of the powder during the test.

Percentage of sample passing through each sieve was calculated by the following formula:

Percentage of sample passing through each sieve =

$$\frac{\text{(Wt. of the sample taken – Wt. of the sample remaining on the sieve)}}{\text{Wt. of the sample taken}} \times 100$$

Uniformity of weight [9]

20 tablets of *Swasa Kudori Mathirai* were selected at random and average weight was calculated. Individual weight of the tablets was also calculated. Not more than two of the individual weights should be deviated from the prescribed average weight by more than the percentage. None should be deviated by more than twice of that percentage.

Friability, Hardness, Disintegration Time [10**]**

Friability

It was determined by means of apparatus for the friability test. The tablets should be carefully de dusted prior to testing.10 tablets were weighed accurately and rotated it for 100 times in the drum. The loose dust was removed from the tablets as before, and accurately weighed. Friability was then calculated.

Hardness

The hardness of 10 tablets were selected randomly was determined by Monsanto hardness tester. In this test the tablet is placed between two anvils, force is applied to the anvils, and the crushing strength that just causes the tablet to break is recorded.

Disintegration time

It was calculated by means of disintegration apparatus. The tank of the disintegration apparatus was filled with distilled water up to the mark. 750 ml of distilled water was filled in each of the 1000 ml beaker. The instrument was set for 90 minutes and the temperature of water in the beaker was set to 37c± 0.5c. One tablet was introduced into each tube of the apparatus and a disk was added to each tube. The apparatus was operated and the time duration at which the tablet disintegrated was noted.

Bulk density [11]

A weighed quantity of 15g *(m)* of sample powder was gently introduced in to a 50 ml dry graduated cylinder without compacting. Carefully the powder was leveled up without compacting, and the unsettled apparent volume ($V0$) to the nearest graduated unit was read. The bulk density was calculated in (g/ml) using the formula $m/V0$.

Tap density [11]

15 g of sample powder was filled in 50 ml of dry graduated measuring cylinder. It was then placed on a mechanical tapper apparatus which operates for a fixed number of tap (approximately 100) until the powder has reached to its minimum level. Volume was measured to determine its tapped density.

Angle of repose [12]

The material was poured through a funnel to form a cone. The angle of repose was formed on a fixed base with a retaining lip to retain a layer of powdered sample on the base. The base should be free of vibration. The height of the funnel was varied carefully to build up a symmetrical cone of powder. Care was taken to prevent vibration as the funnel was moved. The funnel was maintained approximately 2–4 cm from the top of the powder pile as it was being formed in order to minimize the impact of falling powder on the tip of the cone. The height of the pile (h) and the radius of the base (r) was measured using a ruler.

The angle of repose θ, was calculated by the formula,

$\text{Tan}\theta = h/r$

$\theta = \tan^{-1}(h/r)$

Where θ is the angle of repose, h is the height in cm and r is the radius in cm.

Hausner's ratio [12]

It was calculated by the following formula, where $V_{0,}$ the unsettled apparent volume, and V_f, the final tapped volume, of the powder after tapping the material until no further volume changes occurred.

$H = V_0 / V_f$

Carr index [12]

It was calculated by the following formula where $V_{0,}$ the unsettled apparent volume, and V_f, the final tapped volume, of the powder after tapping the material until no further volume changes occurred.

Compressibility index = $100 \times (V_0 - V_f) / V_f$

High performance thin layer chromatography

Sample preparation

100 mg of *Swasa Kudori Mathirai* extract was weighed and dissolved in 70% methanol to get a concentration of 50mg/ml concentration this is then used for injection.

Chromatographic conditions

The finger printing has been done using the following chromatographic conditions. Chromatography was performed on a10x10 cm pre activated HPTLC silica gel 60F 254 plate. Extract of *Swasa Kudori Mathirai* were applied to the plate as 6 mm wide bands with an automatic TLC applicator Linomat 5 with N2 flow (CAMAG, Switzerland), 8 mm from the bottom. Densitometric scanning was performed on CAMAG scanner III. The plates were pre-washed by methanol and activated at 60^{0}C for 5 minutes prior to chromatography. The slit dimension was kept at 5 minutes x 0.45 minutes and 20 minutes scanning speed were employed. The mobile phase was chosen after running each plant in different mobile phases of varying polarity. Chloroform: Ethyl Acetate: Formic Acid: Methanol (3:3:0.4:0.1) served as mobile phase satisfactorily and 10 ml of mobile phase was used per chromatography. Linear ascending development was carried out in 20 cm x 10-em Twin glass chamber saturated with the mobile phase.

Chromatographic analysis

The extract of *Swasa Kudori Mathirai* have been prepared at a concentration of 50 mg/ ml in methanol and were spotted using CAMAG Linomat 5 applicator. The method was optimized by selecting an appropriate mobile phase for the extract of *Swasa Kudori Mathirai* and developed in a twin trough chamber, 20 x 10 cm at 25°C. Various concentrations of the sample from 1 -10 µl were applied in ten tracks. The plates were dried by the hair dryer. The developed plates were scanned at an appropriate wavelength of 254 nm and 366 nm using CAMAG TLC scanner 3 and photo-documented using CAMAG REPROSTAR 3**.**

Results and discussion

Organoleptic characters

It was light brown colour round shaped tablets with the characteristic odor.

Loss on drying at 105°C / moisture content

This parameter determines the amount of volatile matter. (i. e. water drying off from the drug) It was shown in the table 1

The maximum moisture content limit is 8% /g of herbal preparations are satisfactory according to National Agency for Food and Drug Administration and Control **[**13]. Excess moisture content can result in the breakdown of important constituents by enzymatic activity leads to growth of yeast and fungi so that cannot be stored for a long period eventually may lead to rejection of the drug.

pH (10% w/v solution)

This parameter provides a useful practical means for the quantitative indication of the acidity and alkalinity of the sample. The pH (10% w/v solution) of *Swasa Kudori Mathirai* was shown in the table 1. So the drug was acidic in nature.

Table 1: Loss on drying at 105°C/moisture content, pH (10% w/v solution) of *Swasa Kudori Mathirai*

Parameters	Values
Loss on Drying at 105ºC /moisture content	6.52%
pH(10% w/v solution)	5.67

Total ash, acid insoluble ash, water soluble ash

Ash values are important parameter regarding adulteration, identification and purity which were shown in the table 2.

Table 2: Ash values of *Swasa Kudori Mathirai*

Ash values	Percentage
Total ash	9.81%
Acid insoluble ash	2.24%
Water soluble ash	7.38%

Total ash usually consists of carbonates, phosphates, silicates and silica which includes both physiological ash-which is derived from the plant tissue itself and non physiological ash –which is the residue of the adhering material to the plant surface [14]. e. g sand, soil.

Standard references of ash value for Siddha polyherbal formulations has not been documented so far. But according to the European Pharmacopoeia maximum acceptable limit of total ash is 14 % (w/w) and Acid insoluble Ash is 2% [15]

Total ash was within the limit. Acid insoluble ash particularly indicates contamination with sillicious material **[16]** e. g earth and sand. There was a slight increase in acid insoluble ash. Comparison of this with the total ash value of the same sample will differentiate between contaminating materials and variations of the natural ash of the drug. Water soluble ash is that part of the total ash content which is soluble in water.

Sieve analysis

Sieve analysis of *Swasa Kudori Mathirai* (Table 3) revealed percentage of particles retained in each sieve.

Table 3: Sieve analysis and percentage of particles retained in each sieve for *Swasa Kudori Mathirai*

Seive No (µm)	% of particles retained
600	-
300	24.05
150	31.60
75	34.90

Uniformity of weight [9]

This parameter is applicable to tablets and capsules. This parameter is not applicable to ayurveda and siddha formulations consisting of vegetable parts. It is not easier to control the weight of vati/gutti

Nevertheless this test had been performed. Tablets weighing more than 80 mg but less than 250mg of weight should not deviate from the average weight by more than 7.5%. Deviations for tablets were within the range.

Friability, hardness, disintegration time [10]

Friability, Hardness, Disintegration time were also obtained and mentioned in the table 4.

Table 4: Friability, Hardness, Distintegration Time of *Swasa Kudori Mathirai*

Parameters	Values
Friability	0.2142%
Hardness	0.5 kg / cm^2
Distintegration Time	2 minutes and 45 seconds

Friability

This test was intended to determine the physical strength of tablets. A maximum weight loss (obtained from a single test or from the mean of three tests) of not more than 1.0% is considered acceptable for most products [17]. So the friability was within the acceptable range.

Hardness

If the hardness is too high it may delay the disintegration time and if it is too soft it will not withstand the packing conditions. Minimum satisfactory hardness is 4 kg for a compressed tablet. Since the tablets were prepared manually, was not compressed it may not met the minimum limit. Excipients like binding agents may be added to this formulation to increase the hardness.

Disintegration time

Disintegration is defined as that state in which no residue of the unit under test remains on the screen of the apparatus, if a residue remains or it consists of fragments of disintegrated parts of the tablets, vattis, gutika and pills component parts such as insoluble coatings. This test determines whether dosage forms such as tablets, vatti, gutika and pills etc. Disintegrate within a prescribed time when placed in a liquid medium(water) under the prescribed experimental conditions. An orally administered drug must disintegrate to attain good absorption of its active substance. It was within the acceptable range of 15-30 minutes. Since it was readily disintegrated, it's absorption would be good.

Bulk density and Tap density

The bulk density of a powder is the ratio of the mass of an untapped powder sample and its volume including the contribution of the inter particulate void volume. Hence the bulk density depends on both the density of powder particles and the spatial arrangement of particles in the powder bed. The tapped density is an increased bulk density attained after mechanically tapping a container containing the powder sample [11]. The tap density of a material can be used to predict both its flow properties and its compressibility. The tapped density is measured for two primary purposes, the tapped value is more reproducibly measured than the bulk value, and the "flowability" of a powder is inferred from the ratio of these two measured densities [18].

Bulk density and tapped density of *Swasa Kudori Mathirai* granules was obtained and mentioned in the table 5.

In a free-flowing powder, inter particulate interactions are less significant, and the bulk and tapped densities will be closer in value. For poorer flowing materials, there are frequently greater interparticulate interactions, and a greater difference between the bulk and tapped densities will be observed. Since Bulk density and Tapped density of *Swasa Kudori Mathirai* powder were in a closer value indicates that it has a good flowing property.

Table 5: Bulk density and Tapped density of *Swasa Kudori Mathirai* granules

Parameters	Values
Bulk density	0.50 gm/ml
Tap density	0.61 gm/ml

Angle of repose, Hausner's ratio, carr index

In Siddha system of medicine mathirai (tablet) will be prepared manually is now changing to modern methods for a large scale manufacturing like a rotary multi-station tablet press method. Thus, the flow of powder from the hopper into the dies often determines weight, hardness, and content uniformity of tablets. In case of capsules manufacturing, similar volume filling of powders or granules is widely used [19].

Regarding this understanding the flow property of granules is one of the important parameter in tablet manufacturing process. Powders flow properties are measured using a number of parameters such as angle of repose, compressibility index (Carr's index) and Hausner ratio. Hence the flow properties of *Swasa Kudori Mathirai* were evaluated and showed in the table 6.

Table 6: Values for the flow properties of *Swasa Kudori Mathirai* granules

Parameters	values
Angle of repose	34.21º
Carr index	18.17%
Hausner's ratio	1.22.

Flow properties and their respective values table 6 [12] were compared with *Swasa Kudori Mathirai* granules.

Table 7: Summary of flow properties for powders and their reference values [12]

Character	Angle of repose (degrees)	Hausner's ratio	Compressibility index (%)
Excellent	25-30	1.00-1.11	10
Good	31-35	1.12-1.18	11-15
Fair	36-40	1.19-1.25	16-20
Passable	41-45	1.26-1.34	21-25
Poor	46-55	1.35-1.45	26-31
Very poor	56–65	1.46–1.59	32–37
Very, very poor	>66	>1.60	>38

The flow charcteristics of *Swasa Kudori Mathirai* revealed that it had good flow characteristics.

HPTLC finger printing of *Swasa Kudori Mathirai*

Various concentrations of the Methanolic extract of *Swasa Kudori Mathirai* from 1 -10 µl were applied in ten tracks to get finger printing photo document of *Swasa Kudori Mathirai* at 254 nm and 366 nm (fig. 1 &2), peak areas(graph 1-10) and Peak table(Table 8-17).

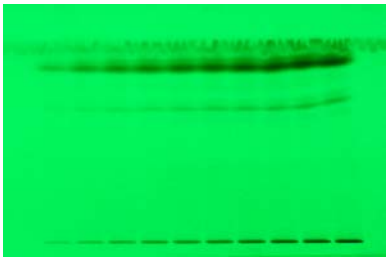


Fig. 1: HPTLC finger printing photo document of *Swasa Kudori Mathirai* at 254 nm

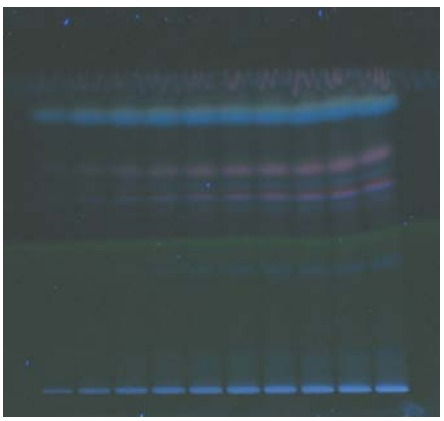
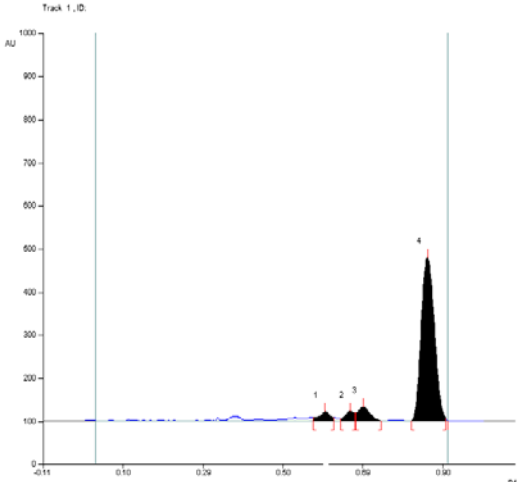
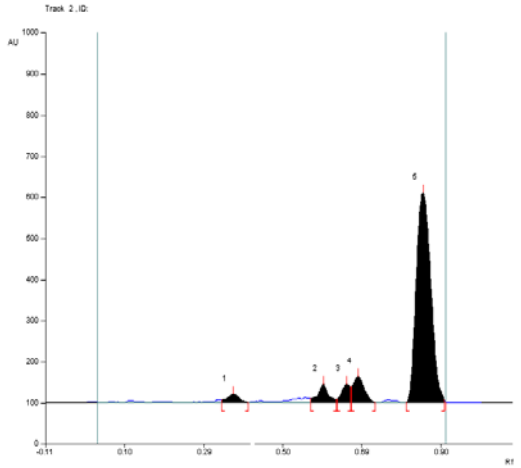


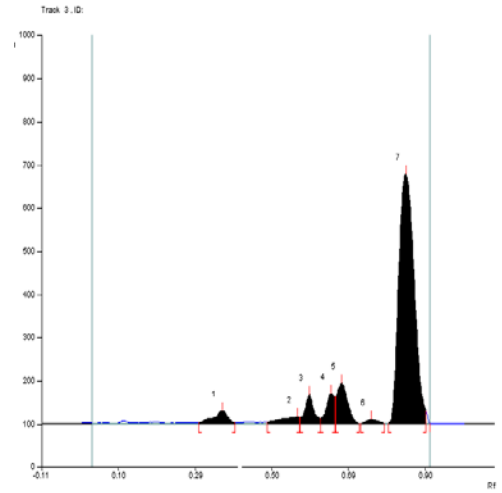
Fig. 2: HPTLC finger printing photo document of *Swasa Kudori Mathirai* at 366 nm



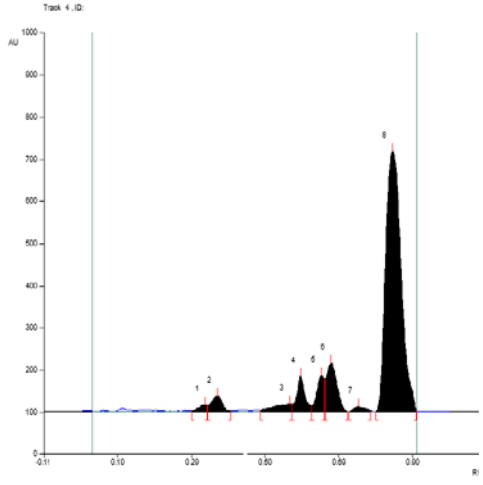
Graph 1: HPTLC chromatogram indicating methanolic extract of 1 µl *Swasa Kudori Mathirai* showing different peaks of phytoconstituents



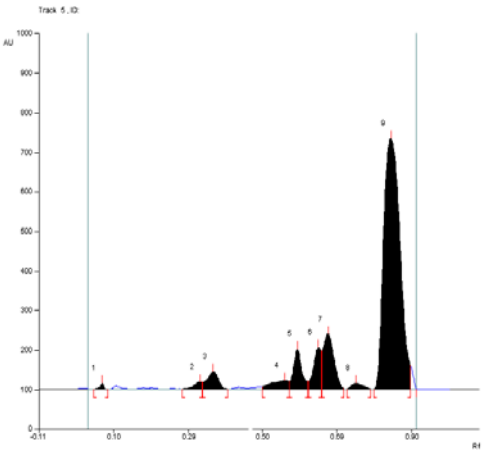
Graph 2: HPTLC chromatogram indicating methanolic extract of 2 µl *Swasa Kudori Mathirai* showing different peaks of phytoconstituents



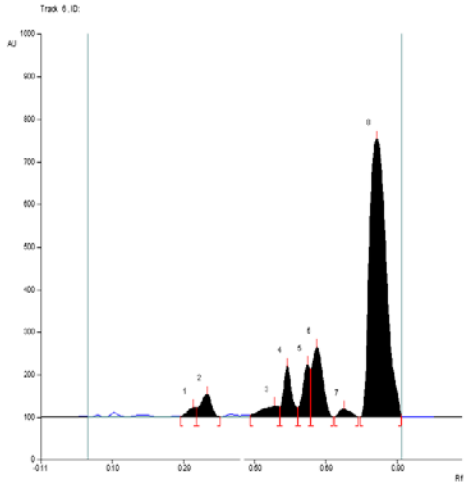
Graph 3: HPTLC chromatogram indicating methanolic extract of 3 µl *Swasa Kudori Mathirai* showing different peaks of phytoconstituents



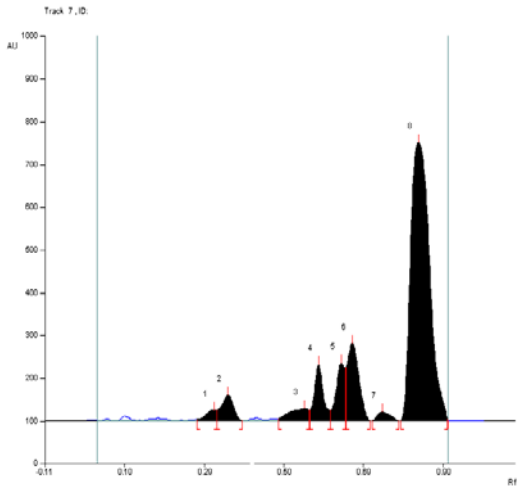
Graph 4: HPTLC chromatogram indicating methanolic extract of 4 µl *Swasa Kudori Mathirai* showing different peaks of phytoconstituents



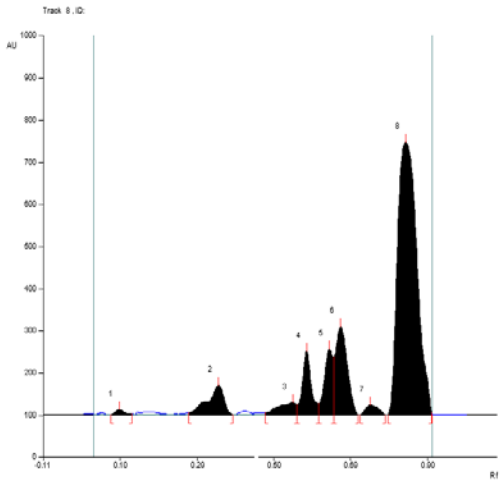
Graph 5: HPTLC chromatogram indicating methanolic extract of 5 µl *Swasa Kudori Mathirai* showing different peaks of phytoconstituents



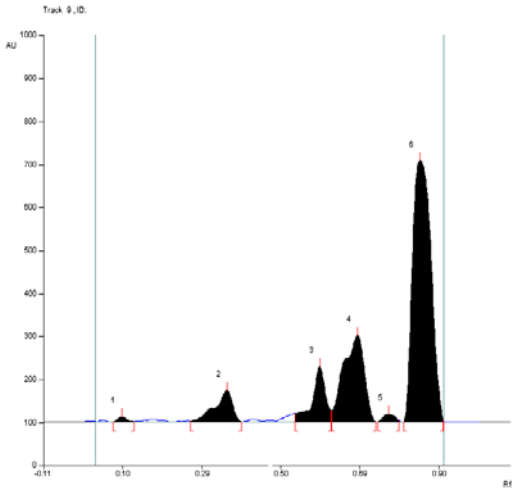
Graph 6: HPTLC chromatogram indicating methanolic extract of 6 µl *Swasa Kudori Mathirai* showing different peaks of phytoconstituents



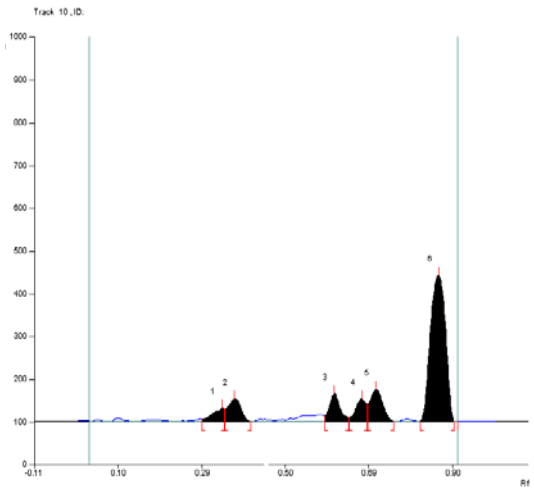
Graph 7: HPTLC chromatogram indicating methanolic extract of 7 µl *Swasa Kudori Mathirai* showing different peaks of phytoconstituents



Graph 8: HPTLC chromatogram indicating methanolic extract of 8 µl *Swasa Kudori Mathirai* showing different peaks of phytoconstituents



Graph 9: HPTLC chromatogram indicating methanolic extract of 9 µl *Swasa Kudori Mathirai* showing different peaks of phytoconstituents



Graph 10: HPTLC chromatogram indicating methanolic extract of 10 µl *Swasa Kudori Mathirai* showing different peaks of phytoconstituents

Table 8: HPTLC chromatogram profile of 1 µl methanolic extract of *Swasa Kudori Mathirai* (Peak list and Rf value)

Track	Peak	Max Rf	Max height	Area %
1	1	0.6	22.1	4.03
1	2	0.66	22.9	3.55
1	3	0.7	33.2	6.75
1	4	0.86	380.5	85.67

Table 9: HPTLC chromatogram profile of 2 µl methanolic extract of *Swasa Kudori Mathirai*.(Peak list and Rf value)

Track	Peak	Max Rf	Max height	Area %
2	1	0.37	20	2.64
2	2	0.6	45.5	5.04
2	3	0.66	45.2	4.22
2	4	0.69	63.8	7.65
2	5	0.85	510.3	80.45

Table 10: HPTLC chromatogram profile of 3 µl methanolic extract of *Swasa Kudori Mathirai* (Peak list and Rf value)

Track	Peak	Max Rf	Max height	Area %
3	1	0.37	29.8	3.73
3	2	0.56	15.9	2.57
3	3	0.59	67.8	5
3	4	0.65	69.2	4.74
3	5	0.68	93.7	8.49
3	6	0.76	10.3	0.97
3	7	0.85	578.9	74.52

Table 11: HPTLC chromatogram profile of 4 µl methanolic extract of *Swasa Kudori Mathirai* (Peak list and Rf value)

Track	Peak	Max Rf	Max height	Area %
4	1	0.33	29.8	1.12
4	2	0.37	15.9	3.08
4	3	0.56	67.8	2.51
4	4	0.59	69.2	5.38
4	5	0.65	93.7	4.79
4	6	0.68	10.3	9.01
4	7	0.75	578.9	1.04
4	8	0.84	618.3	73.07

Table 12: HPTLC chromatogram profile of 5 µl methanolic extract of *Swasa Kudori Mathirai* (Peak list and Rf value)

Track	Peak	Max Rf	Max height	Area %
5	1	0.06	15.4	0.4
5	2	0.33	19.5	1.02
5	3	0.36	44.7	3.43
5	4	0.56	22.1	2.59
5	5	0.59	102.9	5.76
5	6	0.65	105.8	5.35
5	7	0.67	140.6	10.19
5	8	0.75	15.5	1.2
5	9	0.84	634.5	70.07

Table 13: HPTLC chromatogram profile of 6 µl methanolic extract of *Swasa Kudori Mathirai* (Peak list and Rf value)

Track	Peak	Max Rf	Max height	Area %
6	1	0.32	22.5	1.19
6	2	0.36	53.7	3.68
6	3	0.55	25.9	2.82
6	4	0.59	120.1	6.03
6	5	0.64	122.9	5.81
6	6	0.67	164.6	10.68
6	7	0.75	18.7	1.34
6	8	0.84	653.7	68.46

Table 14: HPTLC chromatogram profile of 7 µl methanolic extract of *Swasa Kudori Mathirai* (Peak list and Rf value)

Track	Peak	Max Rf	Max height	Area %
7	1	0.32	25.5	1.43
7	2	0.36	59.5	3.9
7	3	0.55	28.5	2.94
7	4	0.58	131.2	6.35
7	5	0.64	135.7	6.3
7	6	0.67	181.2	11.38
7	7	0.74	19.8	1.34
7	8	0.83	650.7	66.36

Table 15: HPTLC chromatogram profile of 8 µl methanolic extract of *Swasa Kudori Mathirai.* (Peak list and Rf value)

Track	Peak	Max Rf	Max height	Area %
8	1	0.09	11.8	0.52
8	2	0.35	70.8	5.82
8	3	0.54	28.3	2.63
8	4	0.58	149.9	6.75
8	5	0.64	156	6.81
8	6	0.67	208.8	12.46
8	7	0.75	22.9	1.45
8	8	0.84	647.4	63.57

Table 16: HPTLC chromatogram profile of 9 µl methanolic extract of *Swasa Kudori Mathirai* (Peak list and Rf value)

Track	Peak	Max Rf	Max height	Area %
9	1	0.09	13.1	0.59
9	2	0.36	74.2	6.99
9	3	0.59	129.8	9.07
9	4	0.69	202.2	22.3
9	5	0.77	19.3	1.18
9	6	0.85	608.7	59.83

Table 17: HPTLC chromatogram profile of 10 µl methanolic extract of *Swasa Kudori Mathirai* (Peak list and Rf value)

Track	Peak	Max Rf	Max height	Area%
10	1	0.34	33.4	4.43
10	2	0.37	52.7	8.13
10	3	0.61	66.2	8.41
10	4	0.68	53.7	6.66
10	5	0.71	75	11.13
10	6	0.86	343.2	61.26

Methanolic extract of *Swasa Kudori Mathirai* 1 µl indicates the presence of 4 compounds with Rf value ranging from 0.6 to 0.86 in which the highest concentration of the phytoconstituents was found to be 85.67% with the corresponding Rf value of 0.86.

2 µl indicates the presence of 5 compounds with Rf value ranging from 0.6 to 0.85 in which the highest concentration of the phytoconstituents was found to be 80.5% with the corresponding Rf value of 0.85.

3 µl indicates the presence of 7 compounds with Rf value ranging from 0.37 to 0.76 in which the highest concentration of the phytoconstituents was found to be 74.52 % with the corresponding Rf value of 0.85.

4 µl indicates the presence of 8 compounds with Rf value ranging from 0.33 to 0.84 in which the highest concentration of the phytoconstituents was found to be 73.07% with the corresponding Rf value of 0.84.

5 µl indicates the presence of 9 compounds with Rf value ranging from 0.06 to 0.84 in which the highest concentration of the phytoconstituents was found to be 70.07% with the corresponding Rf value of 0.84.

6 µl indicates the presence of 8 compounds with Rf value ranging from 0.32 to 0.84 in which the highest concentration of the phytoconstituents was found to be 68.46 % with the corresponding Rf value of 0.84.

7 µl indicates the presence of 8 compounds with Rf value ranging from 0.32 to 0.83 in which the highest concentration of the phytoconstituents was found to be 66.3% with the corresponding Rf value of 0.83.

8 µl indicates the presence of 8 compounds with Rf value ranging from 0.09 to 0.84 in which the highest concentration of the phytoconstituents was found to be 63.5% with the corresponding Rf value of 0.84.

9 µl indicates the presence of 6 compounds with Rf value ranging from 0.09 to 0.85 in which the highest concentration of the phytoconstituents was found to be 59.83% with the corresponding Rf value of 0.85.

10 µl indicates the presence of 6 compounds with Rf value ranging from 0.34 to 0.86 in which the highest concentration of the phytoconstituents was found to be 61.26% with the corresponding Rf value of 0.86.

CONCLUSION

This study was an attempt to establish the fundamental scientific assessment of *Swasa Kudori Mathirai* to explore the physico-chemical characters and identity. All the parameters investigated were found to be satisfactory.

The data obtained from this study will evolve as preceding factor in standardization of this polyherbal formulation and also for other formulations in Siddha system of medicine.

CONFLICT OF INTERESTS

Declared None

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