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Research Article

## Standardization Parameters for Herbal Formulation, Avipattikar Churnam

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### ABSTRACT

Herbal formulations are being used by human society from a very long period of time. To ensure quality of the herbal formulation, a number of standardization parameters are set. Although there are large number of Ayurvedic formulations, standards of quality are yet to be laid for many of them. Avipattikar Churna is one of the important herbal formulation used for stomach diseases like dyspepsia, gastritis, hyper acidity, loss of appetite and stomach burning sensation. In this work, a standardization of herbal formulations of avipattikar churna is reported in terms of organoleptic evaluation of ingredients with rasayana formulation, loss of drying analysis, foreign matter, phytochemical screening, evaluation of ash value, extractive value and rheological evaluation.

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## 1. INTRODUCTION

Herbal formulations are used by people in general because of its negligible adverse effect. Formulations in natural system of medicine are asava or arista, arka, avleha or leha or paka, kvatha, churna, rasayana, arka, lepa, vatika, taila, bhasma, parpati etc. out of these formulations, churna is preferred. There are many important churna in Ayurveda, avipattikar

churna is one of the important churna formulation. Formulation of Avipattikar Churna is described in official book of Ayurvedic formulary of India, Bhaishaya Ratnawali & Dhanvantri Shastriya Shidhya Pryogank. Avipattikar churna is one of the laxative used to solve stomach issues. There are many marketed avipattikar churna show difference in amount of ingredients and lack quality establishment of quality parameters in product descriptions. Thus, there is a need for development of standardizations of parameters for avipattikar churna.

This work establishes parameters of standardization for avipattikar churna. The parameters are selected from WHO guidelines as organoleptic analysis, evaluation, loss on drying and presence of foreign matter, physio chemical analysis, establishment of ash value, extracted value and rheological analysis. The results of study are useful for

testing of formulation and conducting advance research on formulations.

## 2. MATERIALS AND METHODS

Avipattikar churna is prepared as describe in official book of Ayurvedic formulary of India, Bhaishaya Ratnawali & Dhanvantri Shastriya Shidhya Pryogank 1part of Adrak, Pippali, Kalimirach, Harad, Bahera, Amla, Nagarmotha, Vidang, Ela, Tejpatra, Vida lavana each and 11 parts clove, 44 parts nishodha & 66 parts Sugar Candy were taken.

### 2.1 Preparation of formulation,

All ingredients were grinded to make fine powder & passed through 80# sieve mixed all drugs except vidalavana and sugar candy powder after the mixing of all herbal power vidalavana added then sugar candy power titurate with all ingredients. Mardanam (Tituration) gunamvardhanam (improved quality of formulation). The tituration process of sugar candy power with herbs sugar preserve the functioning micro elements Phyto chemicals of medicine & assimilate them in their properties. This lab formulation named AVI-III, this preparation according to Dhanvantri Shastriya Shidhya Pryogank. AVI-I and AVI-II formulate as describe in Ayurvedic formulary. The prepared formulation store air tight plastic container. One marketed formulation named MAVI was purchased from local pharmacy store Jhansi.

## 2.2 Organoleptic analysis

Organoleptic analysis included color, odour, taste, touch analysis of ingredients and formulations. Colors are examined at daylight by naked eye. The odour of samples of rasayana was tested by smelling and kept 2 minutes interval between two tests to nullify the nullifying effect of previous sample smelling. The all samples were tasted with time interval of 15 minutes. All the samples were also verified for their touch profiles. All the analysis is repeated by another person to recheck the results.

## 2.3 Loss on drying

To determine loss of drying, a 1 g of air-cooled formulation is placed in a standard bottle. The sample is weighted with bottle. The bottle with sample has been dried using an oven at 100-105° C for one hour. The dried sample is again weighted with bottle and the difference of weights before drying and after drying is measured as loss on drying.

## 2.4 Determination of foreign matter

For determination of foreign matter, a sample of 5g is taken and spread in a thin layer and foreign matter were sorted using a magnifier lens (10x). The sample then passed through sieve of no. 250. The separated foreign matter is weighted to provide the percentage of its presence.

## 2.5 Phytochemical screening

The phytochemical studies were carried out to determine presence of tannin, alkaloids, phenolics, protein, glycoside, carbohydrate, terpene and saponin[11]. Many tests have been conducted like gelatin test, lead acetate test, ferri chloride test, Mayer's dragendroff's, Millon's biuret and Ninhydrin test, Borntranger's test, iodine test, molisch's test, Fehling's test, Libermann's test, Salkowski test, Froth test etc.

## 2.6 Ash Value determination

To determine total Ash value take 2 gm avipattikar churnam lab and marketed formulation and its ingredients on silica dishes ignited in muffle furnace at 550-600° C until it is indicating the free from carbon then cooled and calculated percentage of total ash with reference to the air dried material.

## 2.7 Acid insoluble Ash Value determination

The ash avipattikar churnam lab and marketed formulation and its ingredients were boiled for 5 min with dil. HCL and insoluble matter were collected, washed with hot water then filtered ignited to a constant weight and calculated the percentage with reference to the air-dried drug.

## 2.8 Water soluble Ash Value determination

The total ash obtained from avipattikar churnam lab and marketed formulation and its ingredients were boiled for 5 min with 10 ml water and insoluble matter were collected, washed with hot water then filtered ignited to a constant weight. To determine water soluble ash value, the weight of insoluble matter as subtracted from total ash value. The percentage of water-soluble ash was calculated from air dry formulations and its ingredients.

## 2.9 Extractive values evaluation

The extractive values of avipattikar churnam lab, marketed and its ingredients were recorded in alcohol and water using cold maceration method. Weight 3 gm of air dried herbal drugs and formulations were macerated 100 ml with solvents (alcohol and water) in closed flask for 24 hours and were shaken frequently during 3 hours then allowed to

stand for 18 hours. The mixture was filtered quickly to avoid loss of solvent due to evaporation then take twenty-five ml of in tared flat-bottomed dish and evaporate to dryness at 105° C to a constant weight and percent extractive values (alcoholic and water) were calculated with reference to air dried ingredients and formulation.

## 2.10 Rheological evaluation

All the samples of materials were subjected to tests for rheological evaluation of the samples in terms of tap density, bulk density, angle of repose.

### (i) Bulk density

To measure bulk density, mass of the powder and volume of the powder is required. The powder obtained is then passed through a sieve of size 20#. The powder then put into a 100 ml cylinder. The cylinder is dropped over a wooden plank again and again keeping time interval of 2 seconds from 2 cm height. Powder in cylinder is weighted again. The volume of the cylinder is measured in cm<sup>3</sup>. The bulk density is obtained by dividing weight of the cylinder by volume in cm<sup>3</sup>.

### (ii) Tap density

The powder of a sample taken into 100 ml cylinder. To reduce volume of the material, the cylinder is dropped again and again over a wooden plank from height of 2 cm till there is no significant decrease in volume. Tap density is obtained by ratio of weight of sample in gm to final volume of the cylinder in cm<sup>3</sup>.

### (iii) Angle of repose

In order to execute this test, a glass funnel is kept by using a clamp with a ring support. The glass placed is placed on a micro lab jack. 100 gm powder which was taken into the funnel and the orifice of the funnel was closed by a thumb. To measure the angle of repose, the thumb is removed from the funnel. While removing the thumb, about 6.5 mm difference is maintained between funnel orifice and top of the powder pile. When complete powder comes out of the funnel the angle of heap to horizontal plane is measured, this heap angle is called angle of repose.

### (iv) Hausner Ratio

Hausner ratio is evaluated by the equation mentioned below,

$$H = \frac{\rho_T}{\rho_B}$$

where  $\rho_B$  is bulk density of the powdered sample and  $\rho_T$  is the tapped density of the powdered sample.

### (v) Carr index

It shows of the compressibility strength of powdered sample. It is measured by the equation given below

$$C = 100 \frac{V_B - V_T}{V_B}$$

where  $V_B$  is the volume of a given mass of powdered sample, and  $V_T$  is the tapped volume of the powdered sample.

## 3. RESULTS AND ANALYSIS

### 3.1 Organoleptic Analysis & Physical Features

Organoleptic analysis of the formulation and all raw ingredients were evaluated by earlier discussed method. The

organoleptic analysis summarized in (Table No. 1). Avipattikar Churn (AVI-I, AVI-II, AVI-III) & marketed formulation (MAVI) physically evaluated & data recorded in (Table No. 1). In this analysis the abbreviations are where EO (*Embica Officinalis*), TB (*Termanalia bellerica*) TC (*Termanalia chebula*), ZO (*Zingiber officinale*), PN (*Piper*

*nigrum*), ER (*Embelia ribes*), EC (*Elettaria cardomomum*), PL (*Piper longum*), SA (*Syzygium aromaticum*), OT (*Operculina turpethum*), CR (*Cyperus rotundus*), CT (*Cinnamomum tamala*), SR (*Sarkara*), VL (*Vida lavana*), AVI-I (Avipattikar Churn-I), AVI-II (Avipattikar Churn-II), AVI-III (Avipattikar Churn-III), MAVI (Marketed Avipattikar Churn)

**Table 1: Organoleptic Evaluation of Avipattikar Churn and its Ingredients**

S.No.	Name	Colour	Texture	Odour	Test	Touch
1.	EO	Brown	Rough	Specific	Sour & Sweet	Tough
2.	TB	Yellowish Green	Rough	Slight	Astringent & Bitter	Tough
3.	TC	Light Brown	Moderate fine	Odourless	Astringent	Hard
4.	ZO	Buff	Fibrous	Characteristic	Pungent	Hard
5.	PN	Black	Wrinkled	Characteristic	Pungent	Tough
6.	ER	Brownish Black	Fine	Aromatic	Astringent	Tough
7.	EC	Green	Wrinkled	Aromatic	Aromatic Pleasant	Palpable
8.	PL	Black	Moderate fine	Aromatic	Pungent	Hard
9.	SA	Reddish Brown	Fine	Spicy	Aromatic Pungent	Hard
10.	OT	White	Woody	Specific Unpleasant	Slight Acrid	Hard
11.	CR	Dark Brown	Rough	Specific Pleasant	Bitter	Hard
12.	CT	Light Green	Smooth	Aromatic	Bitter	Palpable
13.	SR	Transparent to white	Smooth	Odourless	Sweet	Crystal
14.	VL	Grayish white	Spongy rough	Odourless	Salty	Tough
15.	AVI-I	Greenish Brown	Gritty	Aromatic Pleasant	Bitterish Sweet	Gritty
16.	AVI-II	Greenish Brown	Gritty	Aromatic Pleasant	Bitterish Sweet	Gritty
17.	AVI-III	Greenish Brown	Gritty	Aromatic Pleasant	Bitterish Sweet	Gritty
18.	MAVI	Greenish Brown	Gritty	Aromatic Pleasant	Bitterish Sweet	Gritty

Analysis of organoleptic properties of ingredients Adrak, Pippali, Kalimirach, Harad, Bahera, Amla, Nagarmotha, Vidang, Ela, Tejpatra, Vida lavana each and Clove, Nishodha & Sugar Candy recorded, Avipattikar Churn lab formulation AVI-I, AVI-II, AVI-III and Marketed formulation MAVI were also evaluated for organoleptically the result of lab formulation & marketed formulation are found smaller. The above organoleptic study is useful for the characterization and identification of Avipattikar Churna.

### 3.2 Determination of loss of drying and foreign matter

Avipattikar Churna lab batches AVI-I, AVI-II, AVI-III, marketed MAVI and its raw materials were evaluated for loss on drying and foreign matter through the method discussed earlier the result of both recorded and tabulated in (Table-2).

**Table 2: Loss on drying and foreign matter content in Avipattikar Churn and its Ingredients**

S.No.	Name	% LOD $\pm$ S.D. (n=6)	% Foreign matter $\pm$ S.D. (n=6)
1.	EO	3.58 $\pm$ 0.548	1.42 $\pm$ 0.242
2.	TB	3.46 $\pm$ 0.248	1.04 $\pm$ 0.202
3.	TC	3.18 $\pm$ 0.192	1.46 $\pm$ 0.224
4.	ZO	2.98 $\pm$ 0.242	0.32 $\pm$ 0.122
5.	PN	2.64 $\pm$ 0.342	1.22 $\pm$ 0.022
6.	ER	3.12 $\pm$ 0.148	1.04 $\pm$ 0.146
7.	EC	3.84 $\pm$ 0.482	1.62 $\pm$ 0.068
8.	PL	3.58 $\pm$ 0.546	1.02 $\pm$ 0.108
9.	SA	2.84 $\pm$ 0.204	2.14 $\pm$ 0.248
10.	OT	3.08 $\pm$ 0.426	1.08 $\pm$ 0.212
11.	CR	2.86 $\pm$ 0.246	1.12 $\pm$ 0.084
12.	CT	2.46 $\pm$ 0.348	1.04 $\pm$ 0.286
13.	SR	3.68 $\pm$ 0.483	1.28 $\pm$ 0.126
14.	VL	2.18 $\pm$ 0.124	1.26 $\pm$ 0.140
15.	AVI-I	3.10 $\pm$ 0.272	Nil
16.	AVI-II	3.22 $\pm$ 0.121	Nil
17.	AVI-III	3.18 $\pm$ 0.264	Nil
18.	MAVI	3.32 $\pm$ 0.248	Nil

The formulation can be stored for a long period because it contain less than 8% moisture so it cannot be decomposed by chemical changes or due to microbial contamination. The

Avipattikar Churna were prepared after removal of foreign matter so in examination no foreign matter was found.

### 3.3. Phyto-chemical screening of Avipattikar Churn and its Ingredients

Result of phytochemical analysis of raw material and laboratory formulation AVI-I, AVI-II, AVI-III and MAVI

marketed formulation of AvipattikarChurna recorded in (Table-3).

Table 3 phytochemical analysis of avipattikar churna

S.N o.	Name	Tannin s	Alkaloid s	Phenolic s	Glycosid e	Carbohydrat e	Terpenoi d	Saponi n	Protei n
1.	EO	+	+	+	+	+	-	+	-
2.	TB	+	+	+	+	+	+	-	-
3.	TC	+	-	+	+	+	+	+	+
4.	ZO	-	+	+	+	+	+	+	+
5.	PN	-	+	+	-	+	+	-	+
6.	ER	+	+	+	+	+	+	-	+
7.	EC	-	+	+	+	+	+	-	+
8.	PL	-	+	-	+	+	+	-	+
9.	SA	+	+	+	+	+	+	+	+
10.	OT	+	-	+	+	+	+	+	-
11.	CR	+	+	+	+	+	+	-	+
12.	CT	+	+	+	-	+	+	+	+
13.	AVI-I	+	+	+	+	+	+	+	+
14.	AVI-II	+	+	+	+	+	+	+	+
15.	AVI-III	+	+	+	+	+	+	+	+
16.	MAVI	+	+	+	+	+	+	+	+

Ginger, kalimircha, eliyachi show absence of tannin while Amla, Hard & Bahera strongly detected tannin. Eight phytochemical groups investigated in lab formulation AVI-I, AVI-II, AVI-III and MAVI marketed formulation of Avipattikar Churna recorded in (Table-3).

Total ash, acid insoluble ash and water soluble ash percent determined for AVI-I, AVI-II, AVI-III and MAVI of Avipattikar Churna and its raw materials also evaluated as per previous describe method. The results are recorded and tabulated in (Table-4).

### 3. 4. Determination of Ash values of Avipattikar Churn and its Ingredients

The total ash value of lab formulation AVI-I, AVI-II, AVI-III and marketed formulation MAVI were  $6.141 \pm 1.224$ ,  $6.181 \pm 0.528$ ,  $6.210 \pm 0.448$  and  $6.241 \pm 0.272$  respectively.

Table 4: Determination of ash value

S.No.	Name	Total ash % W/W S.D. (N=3)	Acid insoluble ash % W/W S.D. (N=3)	Water soluble ash % W/W S.D. (N=3)
1.	EO	$6.846 \pm 0.212$	$1.892 \pm 0.212$	$2.842 \pm 0.124$
2.	TB	$5.482 \pm 0.122$	$0.982 \pm 0.124$	$2.542 \pm 0.211$
3.	TC	$4.122 \pm 0.226$	$1.248 \pm 0.216$	$1.242 \pm 0.124$
4.	ZO	$5.231 \pm 0.210$	$0.882 \pm 0.012$	$2.241 \pm 0.424$
5.	PN	$3.482 \pm 0.482$	$0.328 \pm 0.024$	$1.482 \pm 0.621$
6.	ER	$4.822 \pm 0.482$	$1.220 \pm 0.120$	$1.288 \pm 0.842$
7.	EC	$3.422 \pm 0.321$	$1.812 \pm 0.084$	$1.382 \pm 0.134$
8.	PL	$4.842 \pm 0.280$	$0.512 \pm 0.088$	$1.222 \pm 0.024$
9.	SA	$5.082 \pm 0.128$	$0.848 \pm 0.068$	$1.020 \pm 0.028$
10.	OT	$7.200 \pm 0.620$	$1.412 \pm 0.080$	$2.184 \pm 0.128$
11.	CR	$6.420 \pm 0.120$	$2.240 \pm 0.162$	$2.882 \pm 0.410$
12.	CT	$4.802 \pm 0.302$	$0.568 \pm 0.082$	$1.222 \pm 0.084$
13.	SR	$0.452 \pm 0.055$	$0.212 \pm 0.008$	$0.202 \pm 0.012$
14.	VL	$98.120 \pm 0.246$	$0.248 \pm 0.024$	$96.842 \pm 2.420$
15.	AVI-I	$6.141 \pm 1.224$	$1.843 \pm 0.726$	$3.482 \pm 0.623$
16.	AVI-II	$6.181 \pm 0.528$	$1.483 \pm 0.342$	$3.238 \pm 0.237$
17.	AVI-III	$6.210 \pm 0.448$	$1.347 \pm 0.528$	$3.327 \pm 0.348$
18.	MAVI	$6.241 \pm 0.272$	$1.524 \pm 0.247$	$3.356 \pm 0.427$

Total ash value of lab formulations where less than marketed formulation indicate higher amount of inorganic component in MAVI marketed formulation. Acid insoluble ash value prepared lab AVI-I, AVI-II, AVI-III and marketed formulation

MAVI were  $1.843 \pm 0.726$ ,  $1.483 \pm 0.342$ ,  $1.347 \pm 0.528$  and  $1.524 \pm 0.247$  respectively, indicate that small amount of inorganic impurity like silica and both formulations.

### 5. Determination of Extractive values of Avipattikar Churn and its Ingredients

The percentage extractive values were determined in hexane, ether, chloroform, toluene, ethylacetate, ethyl alcohol and

water. High extractive value determined in water and alcohol was recorded in (Table-5).

**Table 5: Extractive values of Avipattikar Churn and its Ingredients**

S.No.	Name	Alcohol soluble Extractive % W/W S.D. (N=3)	Water soluble Extractive % W/W S.D. (N=3)
1.	EO	41.248 ± 2.428	51.842 ± 2.820
2.	TB	9.128 ± 0.426	38.124 ± 1.522
3.	TC	39.488 ± 2.842	58.268 ± 2.482
4.	ZO	6.182 ± 0.246	3.242 ± 0.248
5.	PN	7.284 ± 0.288	7.421 ± 0.349
6.	ER	12.142 ± 1.84	9.542 ± 0.216
7.	EC	2.422 ± 0.846	10.842 ± 0.486
8.	PL	10.422 ± 0.684	13.842 ± 0.682
9.	SA	10.342 ± 0.284	9.884 ± 0.548
10.	OT	11.084 ± 0.846	9.042 ± 0.236
11.	CR	6.120 ± 10.540	12.200 ± 0.426
12.	CT	5.480 ± 0.420	9.846 ± 0.488
13.	AVI-I	12.123 ± 1.244	65.724 ± 3.442
14.	AVI-II	12.824 ± 1.342	63.884 ± 5.124
15.	AVI-III	14.412 ± 1.321	64.842 ± 3.127
16.	MAVI	13.127 ± 1.484	64.462 ± 4.841

Avipattikar Churn AVI-I, AVI-II, AVI-III and marketed formulation MAVI water soluble extractive value were 65.724 ± 3.442, 63.884 ± 5.124, 64.842 ± 3.127, 64.462 ± 4.841 respectively.

Water soluble extractive value of both formulations was higher than alcohol soluble extractive value. Higher water soluble extractive value implied that water was a better solvent of extraction for the formulation than alcohol.

### Rheological Evaluation of Avipattikar Churn and its Ingredients

Tap density, Bulk density, Angle of Repose, Hausner ratio and Carr's index of the lab formulation, its marketed formulation and ingredients were established through the method discussed and data are tabulated in (Tables-6).

The value of angle of repose for lab formulations AVI-I, AVI-II, AVI-III and marketed formulation MAVI were 33.120, 31.740, 32.980 and 32.380 respectively, which so good flow properties.

**Table 6: Rheological Evaluation of Avipattikar Churn and its Ingredients**

S.No.	Name	Tap density	Bulk density	Angle of Repose	Hausner ratio	Carr's index
1.	EO	0.512	0.440	31.424	1.15	12.21
2.	TB	0.524	0.464	32.164	1.13	15.25
3.	TC	0.788	0.691	33.210	1.14	16.82
4.	ZO	0.580	0.490	31.120	1.18	13.40
5.	PN	0.540	0.420	28.480	1.28	12.82
6.	ER	0.620	0.520	37.330	1.19	17.82
7.	EC	0.530	0.410	35.770	1.29	16.22
8.	PL	0.660	0.590	26.840	1.69	12.83
9.	SA	0.472	0.416	41.122	1.14	16.42
10.	OT	0.590	0.480	38.540	1.23	18.74
11.	CR	0.640	0.560	34.880	1.14	13.83
12.	CT	0.570	0.460	39.730	1.24	18.23
13.	VL	0.490	0.440	26.270	1.11	11.22
14.	SR	0.640	0.580	26.480	1.10	10.88
15.	AVI-I	0.584	0.497	33.120	1.18	14.56
16.	AVI-II	0.579	0.488	31.740	1.19	15.23
17.	AVI-III	0.612	0.502	32.980	1.22	16.23
18.	MAVI	0.591	0.496	32.380	1.19	15.56

The flow properties of lab formulations AVI-I, AVI-II, AVI-III and marketed formulation MAVI were confirmed by ratio 1.18, 1.19, 1.22, 1.19 and 14.56, 15.23, 16.23, 15.56

respectively which indicate good flow properties of formulations.

#### 4. CONCLUSION

In this work, Avipattikar churnam is evaluated according to standard procedures. Initially, organoleptic properties of the material have been evaluated later on extractive values, phytochemical and rheological evaluation has been calculated. The standard established for the formulation can be used as reference by Ayurvedic manufacturers for quality assessment and improvement of their formulation's quality.

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