

EFFECTS OF *DHANYAMLA VASTI* ON *AMAVATA* WITH SPECIAL REFERENCE TO RHEUMATOID ARTHRITIS- A CASE REPORT

Ranasinghe R L D S¹, Ediriweera E R H S S²

¹Medical Officer, MD (Ayu) Scholar, ²Professor

Department of Nidana Chikitsa, Institute of Indigenous Medicine, University of Colombo, Sri Lanka

ABSTRACT

Amavata is a one of the crippling disorder resultant from the derangement of *Agni* (digestive power). The clinical entity of *Amavata* is strikingly similar to the disease Rheumatoid arthritis. The study was conducted in a clinically diagnosed case of *Amavata* (Rheumatoid arthritis). The patient was admitted to the *Panchakarma* female ward treated for 17 days and followed up for one month. Initially the patient was treated orally with 10 ml of *Dhanyamla* twice a day for consequent three days to normalize the *Agni* (Digestive power) as *Dhanyamla* possess good *Deepana* and *Pachana* properties. Thereafter enema was administered with *Dhanyamla* for 14 days. Ayurvedic pharmacodynamic properties, phytochemicals and bioactivities of the ingredients were also studied to identify the therapeutic effect of *Dhanyamla*. Statistically significant improvement was observed in clinical, functional and hematological parameters after the completion of the treatment. Oral administration of *Dhanyamla* followed by *Dhanyamla Vasti* has been found to be an effective therapeutic regimen in the management of *Amavata*.

Keywords: *Dhanyamla*, *Deepana*, *Pachana*, Rheumatoid arthritis.

INTRODUCTION

The word *Amavata* is comprised of two words viz *Ama* and *Vata*.

^[1]Although there are references on *Ama* and *Samavata* in *Vruhat Trayee* there is no detail description available on the disease *Amavata*. Detailed description of *Amavata* is available in *Madhava Nidana* written by *Madhava Acharya* (900 A.D).

^[2]*Ama* is produced in the body as a result of improper digestion due to the weakness of *Jatharagni* (Digestive power).^[3] *Vata Dosha* which is vitiated by indulgence of improper diet and regimen spreads these *Ama* in the whole body through the *Srotas* (body channels) and gets located in the *Sandhis* (joints) to produce the disease.^[4] The disease *Amavata* is characterized of

Bahusandhi Shota (Joint Swelling), *Bahusandhi Shula* (Joint Pain), *Sandhi Stabdhattha* (Joint stiffness) *Aruchi* (Anorexia), *Angamarda* (Body aches) and *Trushna* (Thirst).^[5] The clinical entity of *Amavata* can be correlated with Rheumatoid arthritis (RA). Rheumatoid arthritis is a chronic symmetrical polyarthritis of unexplained cause.^[6] It is a systemic disorder characterized by chronic inflammatory synovitis of mainly peripheral joints. Involvement of joints restricts the normal body movements which may lead to contracture of muscle and permanent deformities.

CASE REPORT

A 34 years old female patient, presented to the outpatient department who

had apparently been normal six months ago insidiously developed pain and oedema in bilateral proximal and distal interphalangeal joints, feet, ankle joints, wrist joints and knee joints along with morning stiffness for more than 1 hour, and intermittent fever. The patient's appetite was greatly impaired and was accompanied by constipation. The nature of the disease was progressive and her routine activities were affected gradually. The symptoms were aggravated during the morning and evening hours, subsiding in the middle of the day. Also the condition was become worsened with the activities such as walking, typing and after bathing. On physical examination all the details of the patient including present history, past history, treatment history and personal history were recorded before the treatment. Patient was admitted to the Panchakarma female ward, Ayurveda Teaching Hospital, Borella, Sri Lanka and kept on a normal diet without any specific restrictions and was advised not to lift any weights. There was no related family history.

Examination

Vitals: Pulse 74/min, regular, full volume; BP -120/80 mmHg; Temperature- 37.9 C⁰ (oral); Respiratory Rate- 18/min.

The nervous system, cardiovascular system, and respiratory system of the patient were within normal limits clinically. Per abdomen examination was normal.

Loco motor system- there was swelling, warmth and tenderness over bilateral knee joints and the left hip. Movements were restricted and painful. The patient was thoroughly analyzed according to Ayurvedic as well as modern norms. The disease was diagnosed as *Amavata* (Rheumatoid Arthritis) and con-

sidered as *Kruccha Sadhya Vyadhi* (curable with difficulties). Thereafter treatment plan initiated.

Treatment

The patient was treated for 17 days. At first, she was administered 10 ml of *Dhanyamla*, twice a day before meal orally for three consecutive days. *Dhanyamla* was given to normalize the *Agni* (Digestive fire) as *Dhanyamla* possess good *Deepana* and *Pachana* properties and also a good appetizer.

After the oral administration of *Dhanyamla*, patient was subjected to *Vasti Karma* with *Dhanyamla* for 14 days continuously. Then the patient was followed up for the period of one month.

Preparation of drugs

Dhanyamla was the main medicament which used for this study.

Dhanyamla is described under the *Sandhana Kalpana* in Authentic Ayurveda Texts. It is a medicinal liquid prepared by fermenting cereals. According to the chemical constituent generated, *Sandhana Kalpana* is again divided into two categories viz *Madya* and *Shukta*. *Shukta* is again two types according to the taste viz *Madhura Shukta* (sweet in taste) and *Amla* (sweet in taste).^[7] Taste of *Dhanyamla* is mainly sour hence it is described under the *Amla Shukta*.^[8]

The research drug was prepared at the pharmacy of National Hospital of Ayurveda, Borella, Sri Lanka following the classical guidelines.

1. Preparation of *Dhanyamla*

a. Ingredients of *Dhanyamla*

Formula of *Dhanyamla* is obtained for this study from the text *Sahasrayoga*, written by *Panditarava*.^[9] Ingredients of *Dhanyamla* and their quantities are given below. [Table No 01]

Table No 01: Ingredients of Dhanyamla and their quantities

Sanskrit Name	Botanical Name (Family)	English Name (Sinhala Name)	Part Used	Proportion in Saha-srayoga	Proportion used in the present study
<i>Tandula</i>	<i>Oryza sativa</i> L. (Poaceae)	Rice (Sahal)	Seed	10 <i>Prastha</i> (7680 g)	250g
<i>Pruthuka</i>	Pressed form of <i>Oryza sativa</i> L. (Poaceae)	Rice flakes (Habalapeti)	Pressed Seed	10 <i>Prastha</i> (7680 g)	250 g
<i>Kulattha</i>	<i>Macrotyloma uniflorum</i> (Fabaceae)	Horse gram (Kollu)	Seed	40 <i>Pala</i> (1920 g)	62.5 g
<i>Laja</i>	Puffed form of <i>Oryza sativa</i> L. (Poaceae)	Pop corn (Vee pori)	Puffed Seed	40 <i>Pala</i> (1920 g)	62.5 g
<i>Kangubeeja</i>	<i>Panicum sumatrense</i> Roth ex Roem. & Schult. (Poaceae)	Little millet (Meneri)	Seed	1 <i>Adhaka</i> (3072 g)	100 g
<i>Kodrava</i>	<i>Paspalum scrobiculatum</i> (Poaceae)	Kodo millet (Amu)	Seed	4 <i>Prastha</i> (3072 g)	100g
<i>Nagara</i>	<i>Zingiber officinale</i> Roscoe (Zingiberaceae)	Ginger (Ingu-ru)	Rhizome	2 <i>Prastha</i> (1536 g)	50g
<i>Nimbuka</i>	<i>Citrus aurantifolia</i> (Rutaceae)	Lime (Dehi)	Fruit	2 <i>Adhaka</i> (6144 g)	200 g
<i>Deepyaka</i>	<i>Trachyspermum involucreatum</i> (Roxb.) Maire (Apiaceae)	Carom (Asa-modagam)	Seed	8 <i>Kudava</i> (1536 g)	50 g
Water				200 <i>Prastha</i> (153.6 L)	5 L
1 Pala = 48 g, 1 Kudava = 192 g, 1 Prastha = 768 g, 1 Adhaka = 3072 g^[10]					

b) Method of Preperation of Dhanyamla^[9]

5 L of Dhanyamla was prepared on an auspicious day. A large deep earthen pot containing water was kept on hearth and boiled. A foresaid drugs given in Table No 01 were coarsely powdered and made

into 9 bundles separately, using clean cloth bags. These bundles were put into the vessel, covered with a lid and heated gently and continuously in moderate fire, up to 30-40 C⁰ temperature for 1 hour for consequent period of 7 days. On eighth day fermented liquid was taken out.

2. Preparation of Dhanyamla Vasti

Doshahara Vasti which is mentioned under the *Niruha Vasti*, in Sharangadhara Samhita was selected for this study. [11] Ingredients of *Doshahara Vasti* are *Kanjika* (*Dhanyamla*), *Gomutra* (Cow's urine) and *Kalka Dravya*. It was considered as *Dhanyamla Vasti* in the present study.

a. Ingredients and their quantities of Dhanyamla Vasti

1. *Kalka Dravya* -
30 g
2. *Kanjika* (*Dhanyamla*) -
100 ml

3. *Gomutra* (Cow's urine) -
100 ml

Preparation of Kalka Dravya

Cleaned and dried ingredients as given in the Table No 02 were powdered separately and ground with water to prepare *Kalka*.

Table No 02: Ingredients of Kalka Dravya

Sanskrit Name	Botanical name	Family	Sinhala Name	Part used	Proportion
<i>Shatahva</i>	<i>Anethum sowa</i>	Umbelliferae	Satakuppa	Seed	7.5 g
<i>Madhu yashti</i>	<i>Glycyrrhiza glabra</i>	Fabaceae	Velmi	Root	7.5 g
<i>Bilva</i>	<i>Eagle marmelos</i>	Rutaceae	Beli	Root	7.5 g
<i>Kutajabeeja</i>	<i>Holarrhena antidysenterica</i>	Apocynaceae	Kelinda Hal	Seed	7.5 g

b) Method of Preparation of Dhanyamla Vasti

100 ml of *Dhanyamla* was added to the 30 g of *Kalka Dravya* and mixed well by triturating using a mortar and pestle. Finally 100 ml of *Gomutra* (Cow's urine) was added and triturated further till they got properly mixed. Total quantity of enemata was 230 ml.

Method of Administration of Dhanyamla Vasti

The patient was kept an empty stomach and was advised to pass urine and stool. Then she asked to lie down on a comfortable bed. Patient was oiled by applying lukewarm Sesame oil on abdomen, thighs and buttocks. After the oleation, the *Ushma Swedana* with hot water vapour was carried out on oiled area. Then the patient was kept in the left lateral position.

The enema was given by using enema can and rubber catheter of gage 09. The anal orifice of the patient was lubricated by smeared with Sesame oil with the help of cotton wool. Oiled rubber catheter is fixed into the enema can and filled with 230 ml of lukewarm enemata. Prior to administration to the patient air in the rubber catheter was removed. The rubber catheter was introduced into anus of the patient up to length of 4 inches of the anus. To prevent the entry of the air into the anal canal, the rubber catheter was withdrawn from the anus before it completely empty.

Assessment criteria

The patient was assessed clinically, functionally and haematologically.

Clinical Assessment:

Therapeutic effect was recorded using specially prepared Grading scale which is given below.

Grading of *Bahusandhi Shota* (Joint Swelling) ^[12]

Grade	Symptoms
0	No swelling
1	Barely detectable impression when finger is pressed into skin.
2	Slight indentation.15 seconds to rebound.
3	Deeper indentation.30 seconds to rebound.
4	> 30 seconds to rebound.

Grading of *Bahusandhi Shula* (Joint Pain)

Grade	Symptoms
0	No pain
1	Mild pain (Bearable in nature)
2	Moderate pain (Appears frequently, but no difficulties in movements)
3	Slight difficulty in joint movements due to pain, remain throughout the day
4	More difficulty in joint movements due to severe pain, disturb sleep and require analgesics

Grading of *Sparsha Asahyata* (Tenderness)

Grade	Symptoms
0	No Tenderness
1	Subjective experience of Tenderness
2	Wincing on face of pressure
3	Wincing on face with withdrawal of affected parts on pressure
4	Resist to touch

Grading of *Sandhi Stabdhattha* (Stiffness Time)

Grade	Symptoms
0	No Stiffness
1	Stiffness lasting for 5min
2	Stiffness lasting for 5min-2hrs
3	Stiffness lasting for 2hrs- 8hrs
4	Stiffness lasting for >8hrs

Grading of *Jvara* (Fever)

Grade	Symptoms
0	Normal 36.7- 37.2 C ^o
1	Mild Fever 37.3- 37.8 C ^o

2	Moderate Fever	37.9- 39.4 C ^o
3	High Fever	39.5- 40.5 C ^o
4	Hyperpyrexia	> 40.5 C ^o

Grading of *Aruchi* (Anorexia)

Grade	Symptoms
0	No Anorexia
1	Occasional Anorexia
2	Intermittent Anorexia
3	Often Anorexia
4	Always Anorexia

Grading of *Angamarda* (Body aches)

Grade	Symptoms
0	No body aches
1	Occasional body aches
2	Intermittent body aches
3	Often body aches
4	Always body aches

Grading of *Trushna* (Thirst)

Grade	Symptoms
0	No thirst
1	Occasional thirst
2	Intermittent thirst
3	Often thirst
4	Thirst do not quench with drinking water

Functional Assessment

1. General Functional Capacity

Grade	Symptoms
0	Patient is totally bed ridden
1	Few activities are persisting patient requires an attendant to take care of him/herself
2	Few activities are persisting but patient can take care of him or herself
3	Frequent normal activity despite slight difficulty in joint movement
4	Complete ability to carry on all routine duties

2. Walking Time Index

Grade	Symptoms
0	> 40 sec
1	31- 40 sec

2	21- 30 sec
3	16 - 20 sec
4	0-15 sec

3. Gripping Power

Grade	Symptoms
0	No active range of motion & No palpable muscle contraction
1	No active range of motion & Palpable muscle contraction only
2	Reduced active range of motion & No muscle resistance
3	full active range of motion & No muscle resistance
4	full active range of motion & Reduced muscle resistance
5	full active range of motion & Normal muscle resistance

Hematological Assessment:

- Hemoglobin % (Hb %)
- Total Leucocyte Count (TLC)
- Erythrocyte Sedimentation Rate (ESR)
- Serum Rheumatoid Factor (RF)
- C- Reactive Protein (CRP)

RESULTS

The patient was gradually started to improve with the treatment. 7th day onwards, the fever had subsided and the recovery was fast. After the course of oral administration of *Dhanyamla*, her appetite was improved. End of the series of *Dhanyamla Vasti* she was totally relieved of pain. She was able to perform routine ac-

tivities moving joints freely without any stiffness. Her ESR, which was initially 84 mm /1st hour, had reduced to 06 mm/1st hour after the 17 days of treatment. Considering the nature of the illness, even though the patient was free from complaints, chances of relapse were considerable.

Therapeutic effect on clinical features and functional and haematological changes are given in Table No 03, 04 and 05 respectively.

Table No 03: Improvement of the Clinical features with the treatment

	Before Treatment	7 th day	15 th day	47 th day
<i>Bahusandhi Shota</i> (Joint Swelling)	4	3	1	0
<i>Bahusandhi Shula</i> (Joint Pain)	3	2	1	0
<i>Sparsha Asahyata</i> (Tenderness)	3	1	0	0
<i>Sandhi Stabdhatta</i> (Stiffness Time)	2	1	0	0
<i>Jvara</i> (Fever)	2	1	0	0
<i>Angamarda</i> (Body aches)	4	2	1	0
<i>Aruchi</i> (Anorexia)	3	1	0	0

Quantitative assessment of pain- Visual Analyzing Scale (VAS method)	4	3	2	0
--	---	---	---	---

Table No 04: Changes in the Functional Ability of the patient with the treatment

	Before Treatment	7 th day	15 th day	47 th day
Gripping power	1	2	3	4
Walking time	0	2	3	4
General functional capacity	1	2	3	4

Table No 05: Changes of the Haematological factors with the treatment

	Before Treatment	4 th day	18 th day	47 th day
Hb%	11.6 g/ dl	11.8 g/ dl	11.8 g/ dl	12.0 g/ dl
TLC	5.3 x 10 ^{-9/L}	5.0 x 10 ^{-9/L}	4.8 x 10 ^{-9/L}	4.1 x 10 ^{-9/L}
Rh Factor	320 IU/ ml	280 IU/ ml	140 IU/ ml	35 IU/ ml
ESR	54 mm	48 mm	13 mm	6 mm
CRP	7.4 mg/ l	5.2 mg/ l	4.4 mg/ l	1.2 mg/ l

Ayurvedic Pharmacodynamic Properties of Ingredients of Dhanyamla

Ingredients of *Dhanyamla* have various properties viz *Rasa* (taste), *Guna* (attributes), *Veerya* (potency), *Vipaka* (end product of the digestion) and *Dosha-karma* (action on body humors) which

pacify the vitiated *Doshas* (body humours) in the body. Over all properties of the *Dhanyamla* are given in the Table No 06.

Table No 06: Ayurvedic Pharmacodynamic & other properties of Dhanyamla [13]-[18]

Property	Description
<i>Rasa</i>	<i>Amla</i> (Sour in taste)
<i>Guna</i>	<i>Laghu</i> (easily digestible), <i>Teekshna</i> (penetrating)
<i>Veerya</i>	<i>Ushna</i> (Hot in potency)
<i>Vipaka</i>	<i>Amla</i> (Sour at the end part of the digestion)
<i>Dosha Karma</i>	<i>Vata & Kapha Dosha Shamaka</i> (pacify <i>Vata & Kapha Dosha</i>), <i>Pitta Kopakara</i> (aggravates <i>Pitta Dosha</i>)
Other properties	<i>Deepana</i> (enhance digestion), <i>Jarana</i> (digestive), <i>Ruchya</i> (increase appetite), <i>Preenana</i> (satiating), <i>Mukha Vairasya Hara</i> (eliminate bad taste of the mouth), <i>Mukha Daurgandha Hara</i> (eliminate bad smell of the mouth), <i>Mukha Malahara</i> (eliminate dirty in the mouth), <i>Bhedi</i> (purgative), <i>Vibandhaghna</i> (laxative), <i>Hrudya</i> (good to the heart), <i>Jeevana</i> (sustainer of life), <i>Harshana</i> (exhilarating), <i>Jvara Hara</i> (febrifuge), <i>Shoshahara</i> (eliminate

	dryness), <i>Shramahara</i> (relieve fatigue), <i>Klamahara</i> (relieve exhaustion), <i>Sparsha Sheetala</i> (cold to touch), <i>Daha Nashana</i> (mitigate burning sensation), <i>Thrushna Hara</i> (mitigate thirst), <i>Vasti Shulahara</i> (cures pain in the urinary bladder)
--	---

Phytochemicals of the ingredients of Dhanyamla

Herbal ingredients of *Dhanyamla* naturally contain various phytochemicals. Iso-

lated different phytochemicals are tabulated below. [Table No 07]

Table No 07: Phytochemicals of the ingredients of Dhanyamla ^{[19]-[31]}

Ingredient	Phytochemicals containing
<i>Tandula (Oryza sativa)</i>	Starch, Globulin, Albumin, Oryzagenin, Vitamin B, Trigonelline, Trigonelline
<i>Kulattha (Macrotyloma uniflorum)</i>	Falvonoides, Urease, Glycosides, Lenoleic acid, Polyphenols, Beta Sitosterol, Amino acids- glycine, alanine, cysteine, serine, Isoflavones Genistein, Isoferririn, Cume-sterol, Psoralidin, Galactosidase, Glucosides, Streptogenin
<i>Kangubeeja (Panicum sumatrense)</i>	Alkaloid, Protein, Fat, Minerals, Crude fibers
<i>Kodrava (Paspalum scrobiculatum)</i>	Phenol, Tannins, Alkaloids, Falvonoides, Saponins
<i>Nagara (Zingiber officinale)</i>	Zingerone, Shogaol, Camphene, Phellandrene, Zingibe-rene, Cineol, Borneol, Gingerol, Gingerin, Resins, Gera-niol
<i>Nimbuka (Citrus aurantifolia)</i>	Citric acid, Malic acid, Phosphoric acid, Volatile oil, Hes-peridin
<i>Deepyaka (Trachyspermum involucreatum)</i>	Volatile oil, Phellandrene, Thymol, p- cymol

Bioactivities of the ingredients of Dhanyamla

Herbal ingredients possess different bio-activities. Scientifically proven bioactivi-ties of the ingredients of *Dhanyamla* are

given in the following table. [Table No 08]

Table No 08: Scientifically proven Bio-activities of the ingredients of Dhanyamla ^{[32]-[40]}

Ingredient	Bioactivities
<i>Tandula (Oryza sativa)</i>	Anti-inflammatory
<i>Kulattha (Macrotyloma uniflorum)</i>	Anti-hyperglycemic, Anti-adipogenic, Anti hyperlipi-daemic
<i>Kangubeeja (Panicum sumatrense)</i>	Analgesic, Cytotoxic, Antioxidant, Hypoglycemic
<i>Kodrava (Paspalum scrobiculatum)</i>	Antibacterial, Antitoxic, Anti-inflammatory, Antioxidant
<i>Nagara (Zingiber officinale)</i>	Anti-inflammatory, Analgesic, Hypoglycemic, Anti hyperlipidaemic, Antioxidant

Nimbuka (Citrus aurantifolia)	Antioxidant, Antiplatelet
Deepyaka (Trachyspermum involucreatum)	Anti hyperlipidemic, Anti-inflammatory, Analgesic, Antipyretic

DISCUSSION

According to Chakradatta, Bhava-prakasha, Yogaratnakara and Harita Samhitas *Langhana* (Fasting), *Swedana* (Sudation), use of drug of *Tikta* (Bitter) and *Katu* (Pungent) *Rasa*, *Deepana* drugs (Stimulating hunger), *Virechana Karma* (Therapeutic purgation), *Snehapana* (Oleation) and *Vasti Karma* (Enemas) are the principles of the treatment of *Amavata*.^{[41]- [44]} These Acharyas stated that the *Vasti* (Enema) plays an important role in the management of *Amavata*.

Vasti is the best treatment in Ayurveda to manage vitiated *Vata Dosha*. *Vasti* is also called as *Ardha Chikitsa* or *Sarva Chikitsa*.^[45] In Charaka Samhita *Vasti* is described to draw out all *Doshas* from the foot to the head by its potency.^[46] Charaka Acharya mentioned that in morbid conditions of *Kapha* and *Vata*, enema prepared with *Aranala* (*Dhanyamla*) is beneficial.^[47]

Dhanyamla is *Laghu*; hence it is easy to digest. *Amla Rasa* (sour taste), the predominant *Rasa* of *Dhanyamla* is enhance *Agni* (digestive power) and digests *Amarasa*. *Amavata* is a disease mainly due to the vitiation of *Annavaha* and *Rasavaha Srotas*. *Dhanyamla* consists *Deepana*, *Jarana*, *Preenana* and *Rochana* properties. Therefore it digests the *Ama* and enhances the appetite. By eliminating *Ama* it removes the obstruction of the *Srotas* minimize the process of pathogenesis.

Ushna Veerya of *Dhanyamla* possess the antagonistic properties to that of both vitiated *Vata* and *Kapha Dosha* which are the chief causative factors in this disease. *Vatanulomana*, *Shula Prashamana*, *Vedana Sthapana* and *Sheeta Prashamana* attributes may act on the *Ashti Sandhi* and *Vatavaha Srotas* by reducing the clinical features of *Amavata*.

Jvara (Fever) is the one of the feature of *Amavata*. Therefore oral intake of *Dhanyamla* is beneficial as it is having *Jvaraghna* and *Pachana* properties. *Jeevana*, *Bala Prada*, *Veerya Prada*, *Shramahara* and *Klamahara* properties of *Dhanyamla* also improve the outcome of the patient.

Hesperidin, a one of the glucosides in the ingredients of *Dhanyamla* may reduce inflammation with its anti inflammatory action. Flavonoides are having good antioxidant property. Analgesics actions of *Dhanyamla* may helps to reduce the symptoms.

CONCLUSION

By oral administration of *Dhanyamla* (*Dhanyamla Pana*) clinical features like *Jvara* (Fever), *Angamarda* (Body aches) and *Aruchi* (Anorexia) were subsided. By the administration of *Dhanyamla Vasti Bahusandhi Shula* (Joint pain), *Bahusandhi Shotha* (Joint stiffness), *Sparsha Asahishnuta* (Tenderness over the joint) and *Sandhi Stabdhatta* (Joint stiffness) were reduced significantly. *Kriyahani* (loss of movements) of the joints were also improved. Therefore this case highlights the fact that the disease *Amavata* can be effectively managed with the internal application of *Dhanyamla*.

Further clinical studies should be conducted to validate the treatment principles applied in this case.

REFERENCES

1. Sri Sudarsana Shastri. Editor, Madhava Nidanam of Sri Madhavakara with Sanskrit Madhukosha Commentary. Part I. chapter 25; 5-1. Chaukambha Prakashan. Varanasi. 2014 p. 509
2. Srikanta Murthy KR. editor, Madhava Nidana of Madhavakara. English translation. Chapter 25. Varanasi. Chaukambha Orientalia. 2013. p. 95.
3. Srikantha Murthy KR, editor, Ashtanga Hrudaya Samhita of Vagbhatacharya, English translation. Vol I. Chapter 13; 25. Varanasi. Chowkhamba Krishnadas Academy. 2012 p. 68.
4. Srikanta Murthy KR. editor, Madhava Nidana of Madhavakara. English translation. Chapter 25; 2. Varanasi. Chaukambha Orientalia. 2013. p. 95.
5. Srikanta Murthy KR. editor, Madhava Nidana of Madhavakara. English translation. Chapter 25; 6. Varanasi. Chaukambha Orientalia. 2013. p. 95.
6. Kumar, P. Clerk, M. Clinical Medicine. 6th edn. Spain: Elsevier Saunders. 2006. p. 555-564.
7. Prabhakara Rao G. A text book of Bhaishajya Kalpana Vijnanam. New Delhi. Chaukhamba Publications. 2008. p. 289, 293.
8. Reddy K.R.C. Bhaishajya Kalpana Vijnanam. Varanasi. Chaukhamba Sanskrit Sansthan. 2004. p. 417.
9. Panditarava, D.D.V. Sahasrayoga Hindi Translation. Saptama Prakarana: 46. Delhi. Kendriya Ayurveda Anusandhana parishada. 1990. p. 366, 367.
10. Chandra Murthy P.H, editor, Sharangadhara Samhita of Sharangadhara, English Translation. Purva Khanda, Chapter 1: 24-29. Varanasi. Chaukambha Sanskrit Series Office. 2013. p. 4, 5.
11. Srikanta Muthy K. R. Sarangadhara Samhita of Sharangadhara. English translation. 3rd ed. Uttara Khanda. Chapter VI; 18. Varanasi. Chaukambha Orientalia. 1997. p. 217.
12. Sullivan, S.B. and Schmitz T.J. (Eds.). Physical rehabilitation: assessment and treatment (5th edn.). Philadelphia: F. A. Davis Company. 2007.
13. Srikantha Murthy KR, editor, Ashtanga Hrudaya Samhita of Vagbhatacharya, English translation. Vol I. Chapter 5. Varanasi. Chowkhamba Krishnadas Academy. 2012 p. 68.
14. Sharma RK, Vaidya Bhagavan Dash. editors. Agnivesha, Charaka Samhita. English Translation. Sutra Sthana. Vol I. Chapter 27: 192. Varanasi. Chaukambha Prakashan. 2014. p. 525.
15. Sharma P.V. editor. Sushruta Samhita. English Translation. Sutra Sthana. Vol I. Chapter 45: 214-216. Varanasi. Chaukambha Visvabharati 2013. p. 458.
16. Srikantha Murthy KR, editor, Ashtanga Hridaya Samhita of Vagbhatacharya, English translation. Vol I. Chapter 5: 79, 80. Varanasi. Chowkhamba Krishnadas Academy. 2012 p. 72.
17. Srikantha Murthy KR. Editor. Ashtanga Samgraha of Vagbhata. English Translation. Vol I. Chapter 6: 131, 132. Varanasi. Chaukambha Orientalia. 2012. p. 112.
18. Srikantha Murthy, K.R. editor. Bhavaprakasha of Bhavamishra. English Translation. Vol I. Chapter 6 (XXI): 11. Delhi. Chaukhamba Sanskrit Sansthan. 2002. p. 480.

19. Jayaweera DMA. Medicinal Plants (Indigenous & Exotic) used in Ceylon. Part 3. Colombo: The National Science Council. 1981. p. 45.
20. Warriar PK, Nambiar VPK, Ramanakutty C. editors. Indian Medicinal Plants. Vol 4. Madras. Orient Lonman Ltd. 1994. p.193-198.
21. [Anonymous], Ayurveda pharmacopeia Vol 1. Part 3, Colombo: Department of Ayurveda. 1969. p. 157.
22. Jayaweera DMA. Medicinal Plants (Indigenous & Exotic) used in Ceylon. Part 3. Colombo: The National Science Council. 1981. p. 205.
23. Jayaweera DMA. Medicinal Plants (Indigenous & Exotic) used in Ceylon. Part 3. Colombo: The National Science Council. 1981. p. 57.
24. Warriar PK, Nambiar VPK, Ramanakutty C. editors. Indian Medicinal Plants. Vol 2. Madras. Orient Lonman Ltd. 1994. p.226- 229.
25. Jayaweera DMA. Medicinal Plants (Indigenous & Exotic) used in Ceylon. Part 3. Colombo: The National Science Council. 1981. p. 51.
26. Jayaweera DMA. Medicinal Plants (Indigenous & Exotic) used in Ceylon. Part 5. Colombo: The National Science Council. 1981. p. 217.
27. [Anonymous], Ayurveda pharmacopeia Vol 1. Part 3, Colombo. Department of Ayurveda. 1969. p. 52.
28. [Anonymous], Ayurveda pharmacopeia Vol 1. Part 3, Colombo. Department of Ayurveda. 1969. p. 240.
29. Jayaweera DMA. Medicinal Plants (Indigenous & Exotic) used in Ceylon. Part 5. Colombo. The National Science Council. 1981. p. 11.
30. Jayaweera DMA. Medicinal Plants (Indigenous & Exotic) used in Ceylon. Part 5. Colombo. The National Science Council. 1981. p. 133.
31. [Anonymous], Ayurveda pharmacopeia Vol 1. Part 3, Colombo. Department of Ayurveda. 1969. p. 33.
32. Mathew L.E., Sindhu G., Helen A. *Dolichos biflorus* exhibits anti-inflammatory and antioxidant properties in an acute inflammatory model. Journal of Food and Drug Analysis. 2014. 22 (4), p. 455-462.
33. Koriem KM, Asaad GF, Megahed HA, Zahran H, Arbid MS. Evaluation of the antihyperlipidemic, anti-inflammatory, analgesic, and antipyretic activities of ethanolic extract of Ammi majus seeds in albino rats and mice. Int J Toxicol. 2012 Jun; 31(3). p. 294-300.
34. Ahmad, Iqbal, Mehmood Z, Mohammad F. Screening of some Indian medicinal plants for their antimicrobial properties. Journal of Ethnopharmacology 62.2 .1998. p. 183-193.
35. Ojewole JA. Analgesic, antiinflammatory and hypoglycaemic effects of ethanol extract of Zingiber officinale (Roscoe) rhizomes (Zingiberaceae) in mice and rats. Phytother Res. 2006 Sep; 20(9): p.764-72.
36. Gautam, Nandini, Mantha AK, Mittal S. "Essential Oils and Their Constituents as Anticancer Agents: A Mechanistic View." Bio Med Research International 2014.
37. Lin Lei et al. Plasma Cholesterol-Lowering Activity of Gingerol- and Shogaol-Enriched Extract Is Mediated by Increasing Sterol Excretion. J. Agric. Food Chem., 2014, 62 (43), p. 10515–10521. DOI: 10.1021/jf5043344.
38. Obdulio Benavente-García et al. Uses and Properties of Citrus Flavonoids.

- Agric. Food Chem., 1997, 45 (12), p. 4505–4515. DOI: 10.1021/jf970373s
39. Rao, B. Raghavendra, Manojkumar H. Nagasampige, and M. Ravikiran. “Evaluation of Nutraceutical Properties of Selected Small Millets.” Journal of Pharmacy and Bioallied Sciences 3.2 (2011): 277–279. PMC. Web. 25 Jan. 2015.
40. Ranasinghe R.L.D.S, Ediriweera E.R.H.S.S, “A pharmacological appraisal of *Dhanyamla*.” International Ayurveda Medical Journal. ISSN: 2320 5091. Vol 3; Issue 3. March 2015. p. 778-797. Available at www.iamj.in.
41. Sharma P.V. editor. Cakradatta English translation. 2nd edn. Amavata Chikitsa. Chapter 25: 1. Varanasi. Chaukhamba Publishrs. 1998. p. 227.
42. Srikantha Murthy, K.R. editor. Bhavaprakasha of Bhavamishra. English Translation. Vol II. Madhya Khanda. Part II. Chapter 26: 14, 15. Delhi. Chaukhamba Sanskrit Sansthan. 2002. p. 368.
43. Bhisagratna, Shastri B, editors. Yogaratnakara with Vidyotini Hindi Commentary of Vaidya Lakshmiapati Shastri. Purvardhaya. Amavata Nidanam. Varanasi. Chaukhamba Prakashan. 2013. p. 466.
44. Viadya Jayamini Pandey, editor. Harita Samhita with Nirmala Hindi Commentary. English Translation. Amavata Chikitsa. Varanasi. Chaukhamba Vishvabharati. 2010. p. 375.
45. Srikantha Murthy KR, editor, Ashtanga Hrudaya Samhita of Vagbhatacharya, English translation. Vol I. Chapter 19; 86. Varanasi. Chowkhamba Krishnadas Academy. 2012 p. 254.
46. Sharma P.V. Caraka Samhita Critical Notes incorporating the commentaries. Vol IV. Siddhi sthana. Chapter VII; 64. 2012. p. 266.
47. Charaka Samhita, Atreya Punarvasu, Jaikrishnadas Ayurveda Series, English Translation. Siddhi Sthana. Vol IV. Chapter 3: 35, 35 1/ 2. Varanasi. Chaukhamba Orientalia. 2008. p. 2702.

CORRESPONDING AUTHOR

Dr. Ranasinghe R.L.D.S

Medical Officer, MD (Ayu) Scholar,
Department of Nidana Chikitsa,
Institute of Indigenous Medicine,
University of Colombo, Sri Lanka

Email: rlsandu@gmail.com

Source of support: Nil

Conflict of interest: None Declared