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THE SYSTEMATIC CONCEPTUAL STUDY ON AMAVATA (RHEUMATOID ARTHRITIS)

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ABSTRACT

Madhavakara (700 AD) described first time *Amavata* as a separate disease entity in details. *Ama* and *Vata* have important role in *Nidana* (etiology) as well as in *Chikitsa* (treatment) for *Amavata*. *Amavata* is very closely resembles with Rheumatoid arthritis on the basis of its pathogenesis and clinical manifestations. *Viruddh ahara* (Unwholesome Diet), *Viruddha cheshta* (Erroneous Habits), *Mandagni* (Diminished Agni), *Nishchalata* (Sedentary Life), *Snigdham bhuktavatohi annam vyayamam* (Exertion immediately after taking *Snigdha Ahara* i.e. oily food) are important causative factors for *Amavata*. *Pratyatma Lakshana* (Cardinal Clinical Features), *Samanya Lakshana* (General Clinical Features), *Doshanubandha Lakshana* (Clinical features according to *Dosha* predominance) and *Pravriddhavastha Lakshana* (Clinical features in aggravated condition) are manifested in *Amavata*. *Samprapti* (Pathogenesis), *Upadrava* (Complications) and *Sadhyasadyatva* (Prognosis) of *Amavata* are clearly described in *Madha Nidan*. The principles of treatment of *Amavata* have been first described by *Chakradatta*. *Pathya* and *Apathya* for *Amavata* have been mentioned by in *Bhaisajya Ratnavali*. *Purvarupa* (Prodromal symptoms), *Samprapti Ghataka* (factors for pathogenesis), *Sapeksha Nidana* (Differential diagnosis) and *Upashaya* (Reducing factors)-*Anupashaya* (Aggravating factors) of *Amavata* are described by different authors.

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INTRODUCTION

In Ayurveda, most of the diseases have been taken nomenclature by consideration of the vitiated *dosha*, *dushya*, *marga*, *nidan*, *lakshan*, *samprapti* e.t.c of the concerned disease. In the same way *Amavata* nomenclature has been done on the basis of its two predominant pathological factors i.e. *Ama* and *Vata* having their important role in *Nidana* (etiology) as well as in *Chikitsa* (treatment) for the disease *Amavata*. The term *Amavata* consists of two words *Ama* and *Vata*. *Ama* is an important causative factor which is associated with vitiated *Vata dosha* and producing the disease *Amavata*. The entity *Amavata* has been described in different Ayurvedic texts since ancient period in different context. The *Amavata* as a special disease entity was mentioned first by *Madhavakar*. *Pancha Nidan* or *Nidan panchak* i.e. *Nidan* (etiology), *Purbarupa* (prodromal symptoms), *Rupa* (clinical features), *Upashaya* (Reducing factors)-*Anupashaya* (Aggravating factors) and *Samprapti* (pathogenesis) of *Amavata* are described by different scholars in Ayurveda. Rheumatoid arthritis is a chronic, progressive autoimmune arthropathy and characterized by bilateral symmetrical involvement of joints with some systemic clinical manifestations¹.

Amavata is very closely resembles with the Rheumatoid arthritis on the basis of its pathogenesis and clinical manifestations.

HISTORY OF AMAVATA

As a reference the entity *Amavata* is available since the period of *Charaka* in the context of various treatments of the disease. *Madhavakara* (700 AD) described first time *Amavata* as a separate disease entity in details with a full chapter (25th) for *Amavata* in his famous treatise *Madhava Nidanam* narrating vividly the aetiology, pathogenesis, signs, symptoms and complications of this disease in a systematic manner. *Amavata* is described since ancient period which can be shown in the following manners:

- **Vedic Kala:** In texts of the *Vedic Kala* *Amavata* word is not mentioned but *Ama* related words have been noticed in *Rigveda* and *Atharvaveda*. The term *Ama* is found in different forms like 'Amayath' and 'Amayatham' in *Rigveda*.² 'Amaya' and 'Amayam' words are found in *Atharvaveda* in the context of a disease caused by *Ama* which is toxic or harmful substance.³
- **Samhita Kala:** In *Samhita Kala* *Amavata* is not mentioned as a special clinical entity in Ayurvedic texts but few

descriptions have been noticed in context with *Ama* or *Amavata*. The term *Amavata* is mentioned in *Charak Samhita* in the context of therapeutic uses of *Kansa Haritaki*, therapeutic uses of *Vishaladi Phanta* and in case of *Avarana* of *Vata* with *Ama*.⁴ In *Sushrut Samhita* *Ama* has not been described. *Nidana* (etiology), *Rupa* (clinical features) and *Chikitsa* (treatment) are described in *Bhel Smihita* in context of *Ama Pradoshajanya Vyadhis* and most probably it may be like that of disease *Amavata*.⁵ *Harita Samhita* and *Anjana Nidana* both have described *Amavat* but due to some controversial reason these are not considered in *Samhita Kala*.

- **Sangraha Kala:** *Amavata* is described more precisely as a specific disease entity in different texts in the *Samraha kala*. *Vagbhata* first mentioned as a *Samavata* in the *Astanga Hridaya* and described its clinical features likely to *Amavata*.⁶ *Madhavakara* first mentioned *Amavata* as a specific disease entity in his book *Madhav Nidan* and described etiology, pathogenesis, clinical manifestations, classification and prognosis of *Amavata* elaborately.⁷ Later many authors described vividly *Amavata* as a disease in their book such as *Vrindamadhava* in 9th Cent., *Chakradatta* in 11th Cent., *Vangasena* in 12th Cent., *Gada Nigraha* in 12th Cent., *Sharangadhara* in 13th Cent., *Rasaratna Samuchyaa* in 13th Cent., *Bhavaprakasha* in 16th Cent., *Yoga Ratnakar* in 17th Cent., *Yoga Tarangini* and *Bhaisajya Ratnavali* in 18th Cent. etc.⁸

NIDANA (ETIOLOGY) OF AMAVATA

As per opinion of *Acharya Charaka*, single causative factor may generate single disease or many causative factors together may generate single disease and vice-versa.⁹ *Amavata* (Rheumatoid arthritis) is a disease having a multi-factorial aetiology. *Acharya Madhavakar* has described the causative factors specifically responsible for the disease *Amavata* which are *Viruddh ahara* (Unwholesome Diet), *Viruddha cheshta* (Erroneous Habits), *Mandagni* (Diminished Agni), *Nishchalata* (Sedentary Life), *Snigdham bhuktavatohi annam vyayamam* (Exertion immediately after taking *Snigdha Ahara* i.e. oily food).¹⁰

Viruddha Ahara: *Viruddha* means unwholesome or not suitable for our health and *Viruddha Ahara* vitiates the *doshas*. *Acharya Charaka* has mentioned 18 types of *Virudha Aharas* which are *Desha* (Place) *viruddha*, *Kaal* (Time) *viruddha*, *Agni* (Digestion power) *viruddha*, *Matra* (Dose) *viruddha*, *Satmya* (Suitability) *viruddha*, *Sanskara* (Processing) *viruddha*, *Doshaviruddha*, *Virya* (Active Principle) *viruddha*, *Koshtha* (Bowels) *viruddha*, *Avastha* (State of health) *viruddha*, *Krama* (Order) *viruddha*, *Parihara* (Contra Indication) *viruddha*, *Upachara* (Prescription) *viruddha*, *Paka* (Cooking) *viruddha*, *Sanyoga* (Combination) *viruddha*, *Hrita* (Palatability) *viruddha*, *Sampat* (Richness in properties) *viruddha*, *Vidhi* (Rules of eating) *viruddha*.¹¹

Viruddha Cheshta: *Cheshta* means habits and *Viruddha Cheshta* means some erroneous habits which exert unfavourable effect on our health and it also vitiates the *doshas*. *viruddha ahara* has been mentioned specifically in Ayurvedic classics but *viruddha cheshta* is not described clearly. Some habits may be considered as *Viruddha cheshta* which are *Vega vidharana* (avoid essential urges), *Vega udirana* (intentionally increase urges), *Divaswapa* (day sleep), *Ratri jagarana* (awakening at night), *Ativyayama* (excessive physical exercise), *Vishama shayya shayana* (sleeping in improper posture), *Ativyavaya* (excessive sexual intercourse).¹²

Mandagni: *Mandagni* means diminished of such factors which are responsible for proper nutrition of our body. So, *mandagni* is the vital cause of all diseases.

Nishchalata: *Nishchalata* means inactiveness in physical work or it is the habit of sedentary life style. It causes the aggravation of *Kapha dosha* which is responsible for *mandagni*.

Snigdham bhuktavatoha annam vyayamam: Any person when starts physical work or exercise immediately after taking *snigdha ahara* i.e. oily food, maximum blood circulation will be shifted to skeletal muscles, as a result digestion and absorption will be hampered which disturbs the normal metabolism and assimilation of *ahara* (food).

Purvarupa (Prodromal symptoms) of Amavata: Only in *Vangasen Samhita Purvarupaor* (prodromal symptoms) of *Amavata* had been mentioned which are *Shiraruja* (Cephalgia) and *Gatraruja* (bodyache).¹³

Rupa (Clinical features) of Amavata: The *Rupa/Lakshana* (Clinical features) of *Amavata* have been described vividly by *Madhavakara*, *Bhavamishra* and others. It can be described as follows:

PRATYATMA LAKSHANA (CARDINAL CLINICAL FEATURES)

Sandhi Shula (Joint-pain), *Sandhi Shotha* (Joint-swelling), *Sandhi Stabdhatata* (Stiffness of joint), *Sandhi Sparshasahyata* (Tenderness over joint).

SAMANYA LAKSHANA (GENERAL CLINICAL FEATURES)

Angamarda (bodyache or malaise), *Aruchi* (anorexia), *Trishna* (thirst), *Alasya* (laziness/lethargy), *Gaurava* (heaviness of body), *Jwara* (fever), *Apaka* (indigestion), *Angashunata* (oedema of deferent parts of body including joints).¹⁴

Doshanubandha Lakshana (Clinical features according to Dosha predominance): *Vatanubandha* - *Ruka* (pain), *Pittanubandha* - *Daha* (burning sensation), *Raga* (redness of affected joints), *Kaphanubandha* - *Stimita* (lack of mobility), *Guruta* (heaviness), *Kandu* (itching). *VataPittanubandha* - *Ruka* (pain), *Daha* (burning sensation), *Raga* (redness of affected joints). *VataKaphanubandha* - *Ruka* (pain), *Stimita* (lack of mobility), *Guruta* (heaviness), *Kandu* (itching). *KaphaPittanubandha* - *Stimita* (lack of mobility), *Guruta* (heaviness), *Kandu* (itching), *Daha* (burning sensation), *Raga* (redness of affected joints). *Sannipataja* - Symptoms for all three *doshas*.¹⁵

Pravriddhavastha Lakshana (Clinical features in aggravated condition): *Agnidaurbalya* (lack of digestive capacity), *Praseka* (excessive salivation), *Aruchi* (anorexia), *Gaurava* (heaviness of body), *Vairasya* (improper taste sensation), *Ruja* and *shotha* in *Hasta*, *Pada*, *Shiro*, *Gulpha*, *Trika*, *Janu*, *UruSandhi* (pain and swelling in hands, legs, head, ankle, lowback, knee, hip joints), *Vrishchika damshavata vedana* (scorpion bite like pain), *Utsahahani* (lack of enthusiasm), *Kukshikathinya* (tightness in abdomen), *Kukshishula* (pain in abdomen), *Vibandha* or *Vidvibaddhata* (constipation), *Antrakujana* (borborygmi), *Anaha* (bowel and urine not clear), *Chhardi* (vomiting), *Hridgraha* (pain in precordial region), *Jadyata* (less physical activity or stiffness of the body or immobility), *Bhrama* (vertigo), *Murchcha* (lack of sensory & motor functions), *Nidra-viparyaya* (disturbed sleep), *Daha* (burning sensation), *Bahumutrata* (polyuria).¹⁶

UPASHAYA (REDUCING FACTORS)-ANUPASHAYA (AGGRAVATING FACTORS) OF AMAVATA

The factors which are *Ahara* (dietary regimens), *vihara* (daily life activities) and few medicaments helping to reduce the clinical manifestations of the disease or disease process are known as *Upashaya*. On the contrary, the factors which help to aggravate the clinical manifestations of the disease or disease process are known as *Anupashaya*.

Upashaya: *Katu* (pungent), *Tikta* (bitter), *Ruksha* (rough) drugs, *Deepan* (gastric stimulant), *Pachan* (digestive) drugs, *Langhan* (lightness the body), *Ruksha Sweda* (dry hot fomentation), *Ushna Kala* (summer season) etc.

Anupashaya: *Amla Rasa* (sour taste), *Santarpana* (heavy meal), *Sheeta Kala* (winter season), *Meghodaya Kala* (cloudy weather),

Prataha Kala (morning), Abhyanga (massage) Snehayukta Sweda (fomentation with oil) etc.

SAMPRAPTI (PATHOGENESIS) OF AMAVATA

Intake of *ahita ahara* (faulty diet) and *ahita vihara* (faulty daily life activities) produces *agnimandya* (impaired digestive function) and *dosha prokapa* (aggravation of *dosha*) especially *vata dosha*. As a result ingested foods are not digested properly and undigested food materials generates *Ama* or *Apakka ras* (impaired substances) in the *Amasaya* (stomach), then it is absorbed in the system and it is taken up by the aggravated and vitiated *vata dosha* especially to the *Kapha sthans* mainly *Sandhi* (joints), *Uras* (chest), *Kantha* (throat) etc. and this *Ama* or *Apakka ras* (impaired substances) enters *Dhamani* (channels) with the help of aggravated *Vata*. Here it amalgamates with the existing *prokopita* (aggravated) *doshas* and vitiated further in more and creates distress or obstruction into the body channels due to excessive unctuous nature of *Amarasa* i.e. *Ama* (impaired substances). This *Ama* is important responsible factor for producing the clinical manifestation of *Amavata*.¹⁷

SAMPRAPTI GHATAKA (FACTORS FOR PATHOGENESIS) OF AMAVATA

Dosha	: Vata-Kapha-pradhana Tridosha (Samana and Vyana Vayu, Kledaka and Shleshmaka Kapha and Pachaka Pitta)
Dushya	: Rasa.
Srota	: Rasavaha
Srotodushti	: Sanga.
Agni	: Jatharagni, Dhatvagni.
Rogamarga	: Madhyama.
Udbhava Sthana	: Amashaya, Pakvashaya.
Adhithana	: Sleshma Sthana (Specially Sandhi)
Vyadhi Swabhava	: Chirakari.

UPADRAVA (COMPLICATIONS) OF AMAVATA

Upadrava or complications are manifested in the later period of the *Amavata*. Various *updravas* of *Amavata* are mentioned by different scholars of *Ayurved*. *Madhavakara* mentioned *upadrava* or complications of *Amavata* in *Pravridhamana lakshana* (Clinical manifestations in aggravated condition of *Amavata*) as *Anyani Upadravani* (other complications), *Vijay Rakshita* mentioned *upadrava* as *Sankocha* (contraction of affected body parts)¹⁸ and *Khanja* (lameness), *Vachaspati* mentioned *upadrava* as Various *Vatika* disorders (problems due to aggravation of *vata dosha*), and *Harita* mentioned *upadrava* as *Angavaikalya* (physical deformity).

SADHYASADHYATVA (PROGNOSIS) OF AMAVATA

Madhavakara described clearly the *Sadyasadyatva* of *Amavata* in his book *Madhav nidana* on the basis of *dosha* predominance in *Amavata* which is given below:¹⁹

Sadhya: Dominancy of single *dosha* in *Amavata* indicates disease is *sadhya* (curable).

Yapya: Dominancy of two *doshas* in *Amavata* indicates disease is *yapya* (manageable condition).

Krichchhrasadhya: Dominancy of all three *doshas* associated with *sarvanga shotha* (generalized oedema) indicates disease is *Krichchhrasadhya* (difficult to cure).

SAPEKSHA NIDANA (DIFFERENTIAL DIAGNOSIS) OF AMAVATA

Sapeksha Nidana or differential diagnosis of the disease *Amavata* can be done from *Vata Rakta* (Gout), *Sandhigata Vata* (Osteoarthritis), *Kostruka Sirsha* (Infective arthritis), and *Sandhigata Sannipatika Jwara* (Rheumatoid fever).

CHIKITSA (MANAGEMENT) OF AMAVATA

The principles of treatment of *Amavata* have been first described by *Chakradatta* which are *Langhana* (lightness the body), *Swedana* (warm compress), drugs having *Tikta-Katu Rasa* (bitter-pungent taste) and *Deepana* (gastric stimulant) action, *Virechana* (purgation), *Snehapana* (intake of griteria oil) and *Anuvasana* (enema with Ayurvedic oil) as well as *Kshara basti* (enema with Ayurvedic alkali preparation).²⁰ *Upanaha* (locally applied Ayurvedic medicinal paste) without *Sneha* (oil) is also mentioned to these therapeutic measures by *Bhava Mishra* and *Yogratnakara*.

- Langhana:** *Langhana* is the first line of therapeutic measures for the management of *Amavata* (Rheumatoid Arthritis). It helps to lightness the body.
- Swedana:** *Ruksha Sweda* (dry warm compress) is advised in the treatment of *Amavata* and it is usually applied by *Baluka Pottali* (warm compression with sand).
- Katu Tikta Deepana Dravyas:** *Katu* (pungent), *tikta* (bitter) and *deepana* (gastric stimulant) *dravyas* (substances) are administered in treatment of *Amavata* (Rheumatoid Arthritis) as these have *Deepana* and *Pachana* (digestive) actions.
- Virechana:** *Ama doshas* are come to the *niramavastha* (without *ama*) by applying the therapeutic measures of *Langhana*, *Swedana* and *Tikta, Katu, Deepana dravyas* and then the *niram doshas* should be eliminated from the body with the help of *Virechana karma* (purgation therapy).
- Snehapana:** *Shamana Sneha pana* (intake of griteria.t.c. in reduced dose) is advised to the *Amavata* patient to reduce the *rukshata* (dryness) after taking the above mentioned therapies.
- Basti:** *Basti* is an important therapeutic measure for the treatment of *Amavata* and it is a special type of enema therapy. *Anuvasana basti* (enema with Ayurvedic oil) and *Kshara basti* (enema with Ayurvedic alkali preparation) are administered in the management of *Amavata*.

PATHYA (SUITABLE)–APATHYA (UNSUITABLE) OF AMAVATA²¹

Pathya and *Apathya* for *Amavata* patient have been mentioned by *Govinda Das Sen* in his book *Bhaisajya Ratnavali* which are as follows:

Pathya: The word '*Pathya*' means the foods or drinks which are good or suitable for the channels of the body as per the disease concern. The *pathya* for *Amavata* patients are *Purana* (old) *shali* (Indian traditional rice), *Purana* (old) *shashtika shali* (Indian traditional rice), *Yava* (barley), *Panchakola siddha anna-pana* (five Ayurvedic herbs added with food preparation), *Kodrava* (Kodo millets), *Ushna jala* (lukewarm water), *Purana* (old) *madya* (alcoholic preparation), *Gomutra* (cow urine), *Patola* (parwal), *Karavellaka* (bitter guard or *Momordica charantia*), *Shigru* (dramstick), *Varuna* (*Crataeva nurvala*), *Gokshura* (*Tribulus Terrestris*), *Nimba patra* (neem leaves), *Lahashuna* (garlic), *Shunthi* (dry ginger), *Takra* (butter milk), *Jangala mamsa* (meat of animals of arid regions).

Apathya: The word *Apathya* means the foods or drinks which are bad or unsuitable for the channels of the body as per the disease concern. The *apathya* for *Amavata* patients are *Masha* (black gram), *Upodika* (Indian spinach or Malabar spinach), *Basella alba*, *Anoopa mamsa* (meat of animals living in marshy lands), *Matsya* (fish), *Dahi* (curds), *Dushita jala* (contaminated water), *Sheeta jala* (cold water).

REFERENCES

- Harrison TR, Anthony S. Fauci et al. Harrison's Principles of Internal Medicine, Ed 14, Vol.2, Mc Graw Hill, New York, 1998. pp. 1880-87.
- Lamba K M. Rigveda Saral Hindi Bhasa Me, Mahamaya Publications, 2015, pp. 243-244.
- Kharade B S. Society in the Atharvaveda, D K Print world, 1997, pp. 72-73.

4. Agnivesha, Charaka, Dridhbala, Sharma R K, Dash B. Charaka Samhita (Chakrapani Datta's Ayurveda Dipika), Chikitsa sthan, vol. IV, Ed 1, Reprint, Chowkhamba Sanskrit Series Office, Varanasi, 2012, pp. 1-78.
5. Bhela, Krishnamurthy K H, Sharma P V. Bhela Samhita, Reprint, Chukhamba Visvabharati, Varanasi, 2008, pp. 367-370.
6. Vagbhata, Krishnamurthy K R. Astanga Hridayam, Vol. 2, Ed 5, Krishna das Academy, Varanasi, 2001, pp.497-512.
7. Madhavakara, Rakshita V, Dutta S, Shastri S, Upadhyaya Y. Madhava Nidana (Madhukokosha Vyakya with Vidyotini Hindi Commentary), Ed 26, Part. I, Chaukhambha Sanskrit Sanathana, Varanasi, 1996, pp. 460-464.
8. Debnath S K, Sahu D, Das D, Barik L D, Hazra J. Review on History of *Amavata*, International Journal of Applied Ayurved Research, Vol. III, Issue VI, Jan-Feb 2018, pp. 1016-1020.
9. Agnivesha, Charaka, Dridhbala, Sharma R K, Dash B. Charaka Samhita (Chakrapani Datta's Ayurveda Dipika), Vimansthan, Ed 1, Reprint, Chowkhamba Sanskrit Series Office, Varanasi, 2012, pp. 179-80.
10. Madhavakara, Rakshita V, Dutta S, Shastri S, Upadhyaya Y. Madhava Nidana (Madhukokosha Vyakya with Vidyotini Hindi Commentary), Ed 26, Part. I, Chaukhambha Sanskrit Sanathana, Varanasi, 1996, pp. 460-64.
11. Agnivesha, Charaka, Dridhbala, Sharma R K, Dash B. Charaka Samhita (Chakrapani Datta's Ayurveda Dipika), Sutrasthan, Ed 1, Reprint, Chowkhamba Sanskrit Series Office, Varanasi, 2012, pp. 223-224.
12. Debnath S K, Barik L D, Sahu D, Hazra J. Review on *Nidana* (Etiology) of *Amavata* (Rheumatoid arthritis), International Journal of Ayurvedic and Herbal Medicine, 9(6), Nov.-Dec. 2019, pp. 3674-3678.
13. Byadgi P S. Parameswarappa's Ayurvediya Vikriti-Vijnana & Roga Vijnana, Voll-II, Ed 1, 2009, Chaukhamba Publications, New Delhi, pp. 204.
- 14, 15, 16, 17, 18, 19. Madhavakara, Rakshita V, Dutta S, Shastri S, Upadhyaya Y. MadhavaNidana (Madhukokosha Vyakya with Vidyotini Hindi Commentary), Ed 26, Part. I, Chaukhambha Sanskrit Sanathana, Varanasi, 1996, pp. 460-64.
20. Chakrapabni Datta, Sengupta D, Sengupta U, Senserma K, Bhattacharyya S. Chakradutta, Amavatachikitsa, Ed 1, Deepayan, Kolkata, 2000, pp. 138-141.
21. Govinda Das Sen, Sengupta V, Senserma K, Bhattacharyya S. Bhaisajya Ratnavali, Amavatadhikar, Ed 1, Deepayan, Kolkata, 1999, pp. 148.
