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Research Article

# A STUDY ON STRUCTURAL CHANGES IN JOINTS OF HAND W.S.R. TO *AMAVATA*

**Kunwar Adhar Bhatnagar[1]*, Preeti Srivastava[2]**

*[1]Associate Professor, Department of Sharir Rachna, [2]Assistant Professor, Department of Shalya Tantra, Vivek College of Ayurvedic Sciences and Hospital, Bijnor, UP, India.

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## ABSTRACT

*Amavata* is a chronic disease caused due to the vitiation of *Vata* associated with the *Ama* that circulates all over the body. Though various drug trails and treatment procedures were already carried out on *Amavata*, here an attempt is made to know the structural changes in the joints of hand that occurs in the disease, with the help of Radiography (X-ray), that may aid in the diagnosis and to know the efficacy of treatment. **Objectives:** To study the structural changes in joints of hand w.s.r. to *Amavata*. **Materials and Methods:** 30 diagnosed patients of *Amavata* were selected affecting the joints of hand (wrist, metacarpophalangeal and interphalangeal joints) and X-ray study was done to know the structural changes. **Results**: The study has shown the more of the structural changes in the form of soft tissue swelling, peri-articular osteopenia, bone erosion, joint space narrowing in the early stages of the disease, and secondary osteoarthritis, osteophytes, subluxation and ankylosis in the later stages. **Conclusions:** In metacarpophalangeal joint more of the structural changes are found in the form of soft tissue swelling, periarticular osteopenia and joint space narrowing. Bone erosion and osteophytes were lesser than the wrist joint and subchondral cyst, subluxation, secondary osteoarthritis and ankylosis were seen rarely and in the later stages of the disease. In interphalangeal joints soft tissue swelling, periarticular osteopenia, joint space narrowing was present as early changes. Subchondral cyst, subluxation, secondary osteoarthritis, bone erosion, osteophytes and ankylosis in the later stages of the disease.

## INTRODUCTION

*Amavata* is one of the crippling diseases claiming the maximum loss of the human power. It is not only the disorder of the locomotory system but also is a systemic disease, and is named after its chief pathogenic constituents which are *Ama* and *Vata*. The disease is initiated by consumption of the *Viruddha ahara* and simultaneously indulgence in the *Viruddha vihara*, in the pre-existence of the *Mandagni*[1]. *Amavata*, which produces joint pain and swelling with tenderness, can be correlated with the Rheumatoid arthritis.

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Rheumatoid arthritis is a long lasting autoimmune disease; while the cause of rheumatoid arthritis is unclear genetic and environmental causes have an important role in the progression of the disease[2]. This disease affects 0.5-1% of adults during middle age and women are 2.5 times more affected than the males. It causes inflammation of the joints resulting in painful deformity and immobility especially in the wrist, fingers, knee and ankles.

The hand is subdivided into the carpals, metacarpals and phalanges[3]. In Ayurveda the terminology *Hasta* has variable opinion among *Acharyas*. In present study *Hasta* is considered from the *Manibandha sandhi* to the *Madhyama anguli paryanta* i.e., from wrist joint to the tip of the middle finger.

Though *Amavata* affects many joints but when it affects the small joints of hand, it causes progressive damage and loss of movements of joint such as free motion, power grip, and precision handling and pinching. In the later stages of the disease it will

progress into *Sankocha* (contractures), *Jadyata* (stiffening) and *Angavaikalyata* (deformity) and leads to permanent damage to the joints and loss of such a precious movements of the hand.

## MATERIAL AND METHODS

The present open observational study was conducted to study the structural changes in joints of hand w.s.r. to *Amavata*. Patients were selected from O.P.D and I.P.D of Panchakarma and *Kayachikitsa* department of Sri Siddharoodha Charitable Hospital attached to the N.K.J. Ayurvedic medical college & P.G. Centre, Bidar.

### Inclusion criteria

- Diagnosed patients of *Amavata*.
- Age group 15-60 years, irrespective to sex and treatment.

### Exclusion criteria

- History of accidental trauma to the patients, affecting the wrist and joints of hand.
- Fractures and joint dislocation patients, followed by trauma
- Patients undergone surgical procedure of wrist and joints of hand.
- Patients suffering from diabetes and tuberculosis.

### Assessment Criteria

### Subjective criteria

Already diagnosed patients of *Amavata* with affected wrist and joints of hands

### Objective criteria

Structural changes in wrist joint and joints of hand were identified and analyzed with the help of radiography(X-rays).

### Methods of Collection of Data

### Part 1

- Literary and conceptual study was done on the data compilation from the *Bruhatrayees*, *Laghutrayees* and other classical books, journals, previous work done, and correlated, analyzed with the knowledge of contemporary science on the subject.
- Study of *Sandhi sharira*, *Hasta sandhi sharira* and *Amavata* from Ayurvedic point of view.
- Study of joints, joints of hand, wrist joint and rheumatoid arthritis from contemporary science.
- Study of structural changes with related to the disease *Amavata*, with the help of radiology and from Ayurvedic and modern science.

### Part 2

Dissection of wrist and hand was carried out on cadaver in N.K.J. Ayurvedic College and P.G. Centre, Bidar. Observation were analyzed and correlated in view of Ayurvedic description of *Sandhi* and correlated with the modern science. The dissection procedure has been carried out as per the Cunningham's Manual of Practical Anatomy and B.D. Chaurasia. The dissection procedure was performed and studied thoroughly.

### Part 3

- Patients were informed about the plan of project and oral consent was taken prior to the study.
- Special case proforma was prepared for study based on structural changes in joints of hand W.S.R to *Amavata*.
- Structural changes were seen on the basis of sign and symptomology told in the Ayurveda, with the help of modern parameters like X-rays.

### Part 4

- Most of the patients had structural changes in the form of soft tissue swelling, peri-articular osteopenia, joint space narrowing, bony erosions, osteophytes, and subluxation. Radiological (X-rays) study was carried out in those patients and correlated with the anatomical structures.

## OBSERVATION AND RESULTS

In the present study, 30 diagnosed patient fulfilling the inclusion criteria of *Amavata* were selected and following result were incurred based on observations.

### Demographic Profile of the Patients

In this study it was found that incidence was highest in the age group of 46-60 years constituting 15 patients (50%), followed by 11 patients (36.66%) in 31-45years and 4 patients (13.33%) in the 16-30 years. Among the 30 diagnosed patients of *Amavata* 8 patients (26.66%) were males and 22 patients (73.34%) were females. Among the 30 diagnosed patients of *Amavata* 29 patients (96.66%) were Hindus, 1 patient (3.34%) was Muslim. Among the 30 diagnosed patients of *Amavata*, 5 patients (16.66%) were belonged to poor class, 20 patients (66.66%) belonged to the middle class and 05 patients (16.66%) belonged to rich class. Among 30 diagnosed patient of *Amavata*, 10 patients (33.34%) were house wives, 9 patients (30%) were in service, 6 patients (20%) were in business were 5 patients (16.66%) were in business,2 patients were student (6.66%) and 3 patients were having other work (10%).

### *Prakruthi*

Among the 30 diagnosed patients of *Amavata*, 14 patients (46.66%) belonged to *Kapha-vata prakruthi*, 08 patients (26.66%) belonged to *Vata-pitta prakruthi* and 08 patients (26.66%) belonged to *Pitta-kapha prakruthi*.

### *Pradhan lakshana*

Among the 30 diagnosed patients of *Amavata* 30 patients (100%) were having *Sandhi ruja* and *Sandhi sotha*, 25 patients (83.33%) were having *Vrushikadamsavata pida*, *Sparshaashyata* and *Sandhi stabdata* and 2 patients (6.66%) were having *Sankocha*.

***Anubandhalakshana***

Among the 30 diagnosed patients of *Amavata* 27 patients (90%) were having *Angamarda*, 25 patients (83.33%) were having *Nidravipryaya*, 23 patients (76.66%) were having *Aruchi* and *Vairasya* each, 15 patients (50%) were having *Gaurava*, 10 patients (33.34%) were having *Jwara*, 9 patients (30%) were having *Daha* and 8 patients (26.66%) were having *Bahumutrata*.

**Table 1: Incidence of Joint Involved**

| S.No | Incidence of joint involved | No of patients | Percentage (%) |
|---|---|---|---|
| 1 | Wrist joint | 30 | 100% |
| 2 | MCP joint | 30 | 100% |
| 3 | IP joint | 30 | 100% |
| 4 | Elbow joint | 18 | 60% |
| 5 | Knee joint | 8 | 26.67% |
| 6 | Other joints | 15 | 50% |

Among 30 diagnosed patients of *Amavata*, 30 patients (100%) were having involvement of the wrist, MCP and IP joint, 18 patients (60%) were having elbow joint involvement, 8 patients (26.67%) were having knee joint involvement and 15 patients (50%) were having other joints involvements.

**Table 2: Radiological changes in wrist joint**

| S. No | Structural changes | Total No. of patients | No. of Patients Having Structural Changes | Percentage (%) |
|---|---|---|---|---|
| 1 | Soft tissue swelling | 30 | 30 | 100 % |
| 2 | Bone erosion | 30 | 12 | 40% |
| 3 | Subchondral cyst | 30 | 05 | 16.66% |
| 4 | Peri articular osteopenia | 30 | 20 | 66.66% |
| 5 | Joint space narrowing | 30 | 22 | 73.33% |
| 6 | Osteophytes | 30 | 07 | 23.33% |
| 7 | Sec. Osteoarthritis | 30 | 05 | 16.66% |
| 8 | Subluxation | 30 | 02 | 6% |
| 9 | Ankylosis | 30 | 01 | 3% |

Among the 30 diagnosed patients of *Amavata* affecting the wrist joint 30 patients (100%) were having soft tissue swelling, 12 patients (40%) were having bone erosion,05 patients (16.66%) were having subchondral cyst, 20 patients (73.33%) were having periarticular osteopenia, 22 patients (73.33%) were having joint space narrowing, 7 patients (23.33%) were having osteophyte and 5 patients (16.66%) having secondary osteoarthritis, 2 patients (6%) were having subluxation and 1patient (3%) was having ankylosis.

**Table 3: Radiological changes in metacarpophalangeal joint**

| SI No | Structural changes | Total No. of patients | No. of Patients Having Structural Changes | Percentage (%) |
|---|---|---|---|---|
| 1 | Soft tissue swelling | 30 | 30 | 100% |
| 2 | Bone erosion | 30 | 09 | 30% |
| 3 | Subchondral cyst | 30 | 03 | 10% |
| 4 | Peri articular osteopenia | 30 | 23 | 76.66% |
| 5 | Joint space narrowing | 30 | 10 | 33.33% |
| 6 | Osteophytes | 30 | 05 | 16.66% |
| 7 | Sec. Osteoarthritis | 30 | 04 | 13.33% |

| | | | | |
|---|---|---|---|---|
| 8 | Subluxation | 30 | 03 | 10% |
| 9 | Ankylosis | 30 | 00 | 0% |

Among the 30 diagnosed patients of *Amavata* 30 patients (100%) were having soft tissue swelling, 9 patients (30%) were having bone erosion, 3 patients (10%) were having subchondral cyst, 23 patients (76.66%) were having periarticular osteopenia, 10 patients (33.33%) were having joint space narrowing, 5 patients (16.66%) were having osteophytes, 4 patients (13.33%) were having secondary osteoarthritis, 3 patients (10%) were having subluxation and no patient was having ankylosis.

**Table 4: Radiological changes in interphalangeal joint**

| S. No | Structural changes | Total No. of patients | No. of Patients Having Structural Changes | Percentage (%) |
|---|---|---|---|---|
| 1 | Soft tissue swelling | 30 | 30 | 100% |
| 2 | Bone erosion | 30 | 05 | 16.66% |
| 3 | Subchondral cyst | 30 | 03 | 10% |
| 4 | Peri articular osteopenia | 30 | 22 | 73.33% |
| 5 | Joint space narrowing | 30 | 13 | 43.34% |
| 6 | Osteophytes | 30 | 03 | 10% |
| 7 | Sec. Osteoarthritis | 30 | 04 | 13.33% |
| 8 | Subluxation | 30 | 02 | 6.66% |
| 9 | Ankylosis | 30 | 00 | 0% |

Among the 30 diagnosed patients of *Amavata* affecting IP joints 30 patients (100%) were having soft tissue swelling, 5 patients (16.66%) were having bone erosion,3 patients (10%) were having subchondral cyst,22 patients (73.33%) were having periarticular osteopenia, 13 patients (43.34%) were having joint space narrowing, 3patients (10%) were having osteophytes, 4 patients (13.33%) were having secondary osteoarthritis, 2 patients (6.66%) were having subluxation and no patient was having ankylosis.

**RADIOLOGICAL IMAGES**

**Figure 1: Shows soft tissue swelling erosion in proximal IP joints**

**Figure 2: Shows prominent juxta and early articular osteopenia in all IP joints**

**Figure 3: Shows well defined bony erosion and metacarpal bases**

**Figure 4: Shows multiple erosion in carpal with deformity of carpal bones**

**Figure 5: Shows subluxation in MCP joint with ulnar deviation**

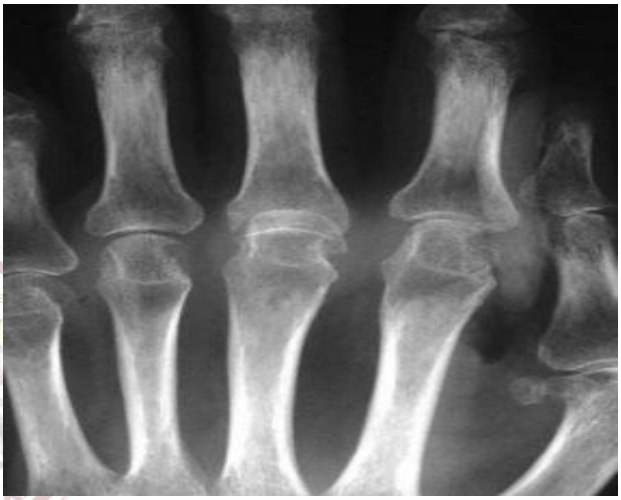

**Figure 6: shows subluxation at II MCP and marginal erosions at II and IV MC**

**Figure 7: Shows marked ankylosis joint of the carpal bones**

**Figure 8: shows Partial collapse, fused carpal bones with subluxation at the Radiocarpal joint**


**Figure no: 9 Shows fused Carpal bones with subluxation at 1st MCP joint with periarticular osteopeni**

## DISCUSSION

While defining the *Sandhis Acharya Sushruta* has told that the union between the bones only to be taken as the *Sandhi*, other union or meeting structures like *Mamsa*, *Sira* and *Snayu* are not to be taken into consideration. In the modern science also joint is defined as the meeting place of two or more bones or cartilages.

The word *Hasta* is used in different meanings in Ayurveda. Some *Acharyas* considered *Hasta* as the whole upper extremity, some from elbow joint to the tip of the middle finger and some others from *Manibandha sandhi* to the tip of the middle finger. *Acharya Sushruta* has described about the *Sandhis* in the *Hasta* as: the 14 *Anguli sandhis*, 3 in each finger and 2 in *Angustha*, which can be correlated with the interphalangeal joints and the metacarpophalangeal joints.

*Amavata* is one of the chronic diseases mainly affecting the joints with some of the constitutional factors. The disease can be compared with the rheumatological disorders and the symptoms of the joints to be compared with the Rheumatoid arthritis. In modern science rheumatoid arthritis is considered as the autoimmune disorder in which both environmental and genetic factors have an important role.

*Ama* can be considered as the antigenic factor which forms the antigen antibody reactions in the joints, where *Pitta dosha* causing inflammation of the synovial membrane and producing the symptoms like *Daha*, *Jwara*, *Raga* etc. Inflammation of the synovial membrane stimulates nerves endings in the joint capsule and producing the symptoms related to the *Vata dosha* like *Ruja*, *Angamarda* etc. In the later stages of the disease when the disease becomes chronic, more of the inflammation causes joint damage and ultimately leads to the *Jadyata* (stiffness), *Sankocha* (contractures), and *Angavaikalyata* (deformity).

In most of the collected X-rays shows, the soft tissue swellings, joint space narrowing, periarticular osteopenia, secondary osteoarthritis etc. This can be inferred as the, In the early stages of the disease synovial membrane inflammation occurs that leads to the soft tissue swelling, that is firstly to develop in the X-ray findings. The underlying pathology causes tenosynovitis, joint effusion etc. that can be best seen in the MRI scans.

In the later stages, disease progresses, the more synovial inflammation causes both the bone and cartilage destruction. Bone destruction produces the structural changes in the forms of Bone erosion, Periarticular osteopenia, Osteophytes and Secondary osteoarthritis.

Cartilage destruction causes the joint space narrowing and Subchondral cyst formation, which causes Subluxation, Ankylosis and Joint deformity in the later stages of the disease.

## CONCLUSION

*Amavata* is one of the chronic, progressive and inflammatory diseases of autoimmune origin and it can be correlated with rheumatoid arthritis. *Hasta sandhis* are, *Anguli* and *Manibandha sandhi*, can be correlated with the interphalangeal and metacarpophalangeal joint, while *Manibandha sandhis* the wrist joint.

- Disease *Amavata* is more prevalent in the fourth and fifth decade of the life and females are affected more, than the males, while *Vata-kapha prakriti* persons are more prone for the development of the disease.
- In wrist joint more of the structural changes are found in the form of soft tissue swelling,

periarticular osteopenia, joint space narrowing, bone erosion and osteophytes, as the early changes. Secondary osteoarthritis, ankylosis, subluxation are found rarely and in the later stages of the disease.

- In metacarpophalangeal joint more of the structural changes are found in the form of soft tissue swelling, periarticular osteopenia and joint space narrowing. Bone erosion and osteophytes were lesser than the wrist joint and subchondral cyst,subluxation, secondary osteoarthritis and ankylosis were seen rarely and in the later stages of the disease.
- In interphalangeal joints soft tissue swelling, periarticular osteopenia, joint space narrowing was present as early changes. Subchondral cyst, subluxation, secondary osteoarthritis, bone erosion, osteophytes and ankylosis in the later stages of the disease.
- Further this study can be continued by using other advanced diagnostic technology.

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***Address for correspondence**
**Dr. Kunwar Adhar Bhatnagar**
Associate Professor,
Department of Sharir Rachna
Vivek College of Ayurvedic Sciences and Hospital, Bijnor, UP
Email:adharbhatnagar@gmail.com