"LITERARY RESEARCH ON STRUCTURAL CHANGES IN KNEE ARTHRITIS W.R.T. AYURVEDIC & MODERN SCIENCE."

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ABSTRACT

Sandhigatvata (osteoarthritis) is the disease produce because of vitiation of vata dosha. In modern terminology we consider its correlation with inflammation of joint called as arthritis. Present study describe the structures affected in knee arthritis, with objective to study the normal anatomy of knee joint & study the sandhigatvata (osteoarthritis) from modern aspect. Study designed by detail literature study of sandhigatvata (osteoarthritis) from ayurvedic and modern text. Then by the comparative study of normal knee & arthritic knee joint. Study result shows degenerative changes in cartilage, joint space, bone ends, menisci and joint alignment. It concludes that most wear & tear occur at knee arthritis changing its alignment to genu varus or jenu valgum with change in gait of a person.

KEYWORD: Sandhigatvata, Janu marma, Cartilage, Osteophyte, Genu Varus, Genu Valgum.

INTRODUCTION

Ayurvedic Concept

Sandhigatvata is described under 80 nanatmaj vyadhi of vata. Its development is slow and symptoms aggravate with time. This disease occurs at multiple joint of body but some weight bearing joints are most commonly affected like hip, knee, and ankle of this knee joint is most affected.

Sandhigatvata is madhyamargagat vyadhi among three rogmarg. Most of the marma(vital points) are found in this rout of disease. Janu marma also found in this rout make this disease more problematic to heal.
There are two ways by which it affects the knee joint. One by dhatukshayjanya (degenerative) vata prakop and other by strotorodhjany (obstructive) vata vimargagaman producing typical signs of sandhigatwata. Vata plays a unique role in producing this disease. Sar kittagat (assimilation) produced vayu is poshak (nutritive) vayu for the poshana (nutrition) of other type of pranvyanadi vayu, so the physiology starts at the pakwashaya (large intestine) level and disturb the further prakrit vata in the body. Which affect the particular joint and produces sandhigatwata.

Charakacharya described in the samprapti (pathophysiology) of disease that joint feel to touch like air filled bag, it swells and produce pain at flexion and extension of joint. When vitiated vata at sandhi (joint) level affects ligaments at joint it causes sciatica, varus, valgus or gibbus deformity of the joint affecting normal axis of that particular joint. Same condition takes place in case of knee joint.

When vitiated vata entered in majja dhatu (bone marrow) it causes osteoporosis of bone, body pain and decrease strength of body. Osteoporotic changes occur in sandhigat vata, it is responsible in making disease more complicated. At knee joint cartilage and bone destruction also concentrate our mind towards symptoms produced by majjagat vayu.

Shleshaka kapha (synovial fluid) present in joint plays important role in normal movement and nutrition of joint structure. It provides flexible movement within joint. In degenerative osteoarthritis condition shleshak kapha quantity get reduced causing restricted movement of joint. Vitiated vata produce pain and swelling at joint level. Other symptoms like stiffness and difficulty in walking also produced.

Thus at knee joint ligament, bone, cartilage and shleshak kapha are affected by vata and produces destructive structural changes at knee joint.

MODERN CONCEPT
Osteoarthritis is slowly evolving disease which affects maximum joints in the body. Condition become worsens with the time. It affect maximum individual before the middle age. Osteoarthritis is cause by degenerative changes in joint. Compare to osteoarthritis rheumatoid arthritis is autoimmune condition involving maximum number of joints at same time. Over use of joint & more pressure over joint are the aggravating factor for osteoarthritis. Number of proliferative changes occurs at joint causing change in joints
normal anatomy. Knee joint is the prime weight bearing joint of the body which is most commonly get affected in osteoarthritis. Symptoms of osteoarthritis start with joint pain, morning stiffness & functional impairment of joint. Signs like crepitus, tenderness, restricted movement & change in joint alignment occur.

**Structure of Knee Joint**

**Osteology**

Knee joint is the largest joint of body, hing or condyloid in nature. Femur participates in formation of knee joint with its distal two condyle. These condyles are covered with hyaline cartilage to protect bone from bone to bone friction. Tibia is second important bone in knee joint formation. It participates with proximally in knee joint formation with its two condyle to articulate with femur. Intercondyler eminence over tibia separates anterior & posterior cruciate ligament. Tibial tubercle provides incersion for patellar tendon. Patella a largest sesamoid bone functions as fulcrum for quadriceps tendon. Patella protect knee joint & enhance lubrication & nutrition of knee joint with its surrounding bursa. Fibula doesn’t take part in knee joint formation, it provide attachment site for fibular collateral ligament.

**Ligaments**


**Other Minor structure**

Menisci or semilunar cartilage are two ‘C’ shaped cartilaginous structure situated on tibial plateau. They act as shock absorber & increase the concavity of tibial condyle. There are 13 bursa or fat plates present around the knee joint they prevents joint from external trauma. Normally knee joint is present in slight valgus position with longitudinal axis of femur & tibia 170° laterally.

**Pathophysiology for Osteoarthritis**

Overuse & degenerative changes at knee joint lead to degeneration of protective cartilage. This also take place by loss of proteoglycane contain of cartilage. Also the inflammation of synovium & joint capsule takes place. Ligaments of the joint become thickened & fibrotic. In cronic stage menisci also get damaged. To overcome the distructed protective cartilage bone
spurs are developed at the margin this spurs are called as osteophytes. Development of osteophyte leads to increase in subchondral bone volume. At the same time decrease in synovial fluid causes joint space reduction. Reduced joint space increases bone to bone friction aggravating osteoarthritic changes.

![Fig 1: Comparison between normal and osteoarthritic knee joint.](image)

**Structure Affected In Knee Osteoarthritis**

Prime structure involved in knee arthritis is bony cartilage. At first cortical line of the bone get destructed it is mostly seen in X-ray examination. Intracapsular bone erosion first occur at the joint margin & then it moves towards the centre. Erosion of bony cartilage and cortical distruction leads to bony spur formation at bone epiphysis these are osteophyte.\(^9\) Osteocyte has role in phosphate metabolism by producing hormone-FGF23, which is responsible for sensing & responding to mechanical load over the skeleton. This responce by osteocyte also responsible in osteophyte formation.

Amount of synovial fluid get decreased with the degenerative changes. Also ligament, menisci & bursa around the joint get affected in chronic stage. This structural changes causes change in normal joint alignment. Two type of alignment deformities are found at knee osteoarthritis. Bow leg deformity is known as genu varum in which medial condyle of tibia & femur are affected. Opposite to that knee knocks occurs in lateral condyle degeneration this is called genu valgum. Both in varus & valgum normal alignment of knee joint change because of degenerative pathology.
AIMS AND OBJECTIVE

AIM
1) To study the structural changes in knee arthritis.

OBJECTIVE
1) To study the normal structural anatomy of knee joint.
2) To study the *sandhigat vata* from modern aspect.

MATERIAL
Detail study of *sandhigatvata (osteoarthritis)* with knee joint from ayurvedic & modern text was done.

METHOD
STAGE 1 Detail literature study of *sandhigatvata (osteoarthritis)* from ayurvedic and modern text.
STAGE 2 Comparative study of normal knee & arthritic knee joint.

RESULT AND DISCUSSION
From the above explained literature structure of the knee joint affected in osteoarthritis are tabulated below.

<table>
<thead>
<tr>
<th>STRUCTURE</th>
<th>CHANGES</th>
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<tbody>
<tr>
<td>1. Cartilage</td>
<td>-Intracapsular erosion</td>
</tr>
<tr>
<td></td>
<td>-Calcification</td>
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<tr>
<td>2. Bone end</td>
<td>-Development of Bony Osteophyte.</td>
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<tr>
<td>3. Synovial fluid</td>
<td>-Decreased in Quantity</td>
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<td>4. Joint space</td>
<td>-Reduced.</td>
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<td>5. Joint Alignment</td>
<td>-Change to Genu Varus or Genu Valgum.</td>
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<tr>
<td>6. Menisci</td>
<td>-Erosion</td>
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<td></td>
<td>-Tear in Chronic stage</td>
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<tr>
<td>7. Ligaments</td>
<td>-Tear in Chronic stage</td>
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It is clear from the literature study that structural involvements in knee osteoarthritis develop slowly with time. At early stages structure involved in arthritic changes are less but with time more & more structure undergo changes. Main cause in joint structural damage is reduced joint space & bone to bone friction. The turnover rate of bone in arthritis is in higher side like in pagets disease & hyperthyroidism. These high turnovers give rise to ‘woven bone’ which is mechanically weak bone. It aggravates the structural damage in knee joint. Some skin diseases also aggravate the arthritic changes in knee joint like in psoriatic & septic arthritis.

Ayurveda also explain that in vata prakop turnover of body structure also increase which explain the above phenomenon of high turnover & woven bone formation. Acharya vagbhata explain the sign of snayugat vata like aayam, kujbata which change the joint alignment. This change in alignment found in varus or valgus deformity of knee joint. Prakupit vata at majja causes osteoporotic changes in bone. Knee osteoarthritis is madhyamargagat vyadhi, this are difficult to treat making it yapya.

Normal vata keep the nature or its environment in normal phase in all season but when prakop of vata takes place it causes janopadodhvans & destruct the nature. Prakupit vata at arthritic knee also destructs its normal structure.

CONCLUSION
Knee arthritis damage joint cartilage, reduces the joint space, develop osteophyte at bone end, change the normal alignment of knee to jenu varum or jenu valgum.

REFERENCES