

## SHIFTING PARADIGMS: THE IMPACT OF RAJONIVRITTHI ON SANDHI-GATAVATA SAMPRAPTI

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## ABSTRACT

Osteoarthritis (OA) strikes women more often than men and it increases in prevalence, incidence and severity after menopause. Among the multiple physio pathological mechanisms involved in OA, those related to sex hormones have been attracting much attention, in particular those involving estrogens. The manifestation of osteoarthritis after the decline of estrogen in menopause has a different pathology compared to the osteoarthritis that occurs as degenerative joint disease. The postmenopausal osteoarthritis is a subtype of osteoarthritis and it is considered as osteoporotic phenotype. The dramatic rise in OA prevalence among postmenopausal women, presence of estrogen receptors (ERs) in chondrocytes, subchondral bone cells and sinoviocytes, suggest a link between OA and loss of ovarian function. A better understanding of the role that estrogen and its deficiency plays in the molecular mechanisms of menopause induced osteoarthritic changes that affect the different joint structures will help further development of new and precise understanding of pathogenesis of Osteoarthritis in menopausal women. The article aims at understanding the pathogenesis of *Janu Sandhigata Vata* in *Rajonivritti* and Providing an insight towards how the Osteoporotic osteoarthritis can be understood in *Ayurveda*.

**Keywords:** Osteoarthritis, *Sandhigata Vata*, Menopause, Estrogen, Pathogenesis

## INTRODUCTION

Menopause is a physiological process universally affects all women who reach midlife. Knee Osteoarthritis, the most common articular disorder begins asymptotically after menopause in the 2nd and 3rd decades and is extremely common by age 70<sup>1</sup>. OA is a chronic degenerative disorder of multifactorial etiology characterized by loss of articular cartilage and peri-articular bone remodeling. It is probably not a single disease but represents the final end result of various disorders as joint failure. OA may cause joint pain, bony or soft tissue swelling, tenderness, bony crepitus, peri-articular muscle atrophy, bony hypertrophy, deformity and marked loss of joint motion. OA strikes women more often than men and it increases in prevalence, incidence and severity after menopause. Radiographic generalized OA is three times more common in women aged 45-64 years compared to their male counterparts. 64% of females with knee osteoarthritis suffered the onset of symptoms either peri menopausal or within 5 years of natural menopause or hysterectomy<sup>2</sup>. The manifestation of osteoarthritis after the decline of estrogen in menopause has a different pathology compared to the osteoarthritis that occurs as degenerative joint disease. A better understanding of the role that estrogen and its deficiency plays in the molecular mechanisms of menopause induced osteoarthritic changes that affect the different joint structures has helped development of new and precise therapeutic strategies to prevent and/or restore damaged articular tissues in OA. *Sandhigata Vata* is mentioned in the context of *Gata Vata* in the classical texts<sup>3</sup>. The *lakshana* are swelling in the joints, and pain which increases extension and flexion of joints<sup>4,5,6,7,8,9</sup>. Osteoarthritis (OA) which is mentioned in western medicine has its similarities with the signs and symptoms of *Sandhigata Vata*. The prevalence of degenerative diseases like *Sandhigata Vata* increases with the commencement of *Parihani avastha* (the phase of deterioration) after 40 years of age. The article aims at understanding the pathogenesis of *Sandhigata Vata* after *Rajonivritti* which can be considered as a subset of *Sandhigata Vata*, specifically *Janu Sandhigata Vata* and Provid-

ing an insight towards how the knee joint Osteoporotic osteoarthritis can be understood in *Ayurveda*.

### BACKGROUND:

The *Samanya Samprapti* for *Vata Vyadhi* explained in classical textbooks of *Ayurveda* can be considered as basis to understand the *Samprapti* of *Sandhigata vata* and *Janu Sandhigata Vata* in particular. Various *Nidana* described in the classics causes *Vata Dosha Prakopa*. Vitiated *Vata Dosha* moves all over the body and gets lodged either in *Eka Pradesha* (*Janu Sandhi*) or *Sarvanga*. While moving it finds a suitable place where there is already having susceptibility or *Khavaigunya*. This in turn results in *Srotodushti* in the form of *Snehadi Guna Kshaya*. This causes further vitiation of *Vata Dosa* resulting in the manifestation of *Ekanga* or *Sarvanga Vata Roga*<sup>10</sup>.

According to *Charaka Samhita*, *Nidana Sevana* vitiates *Vata* and this *Prakupita Vata* gets accumulated in *Rikta Srotas* and gives rise to various generalized and localized diseases<sup>11</sup>. *Chakrapani Dutta* in his commentary *Ayurveda Dipika* on *Charaka Samhita* comments on the word *Rikta Srotas* as *Snehadi Guna Kshaya*<sup>12</sup>. In the manifestation of *Janu Sandhigata Vata* the *Prakupita Vyana Vata* travels along and gets lodged in *Janu Sandhi* where there is already existing *Khavaigunya*, resulting in diminution of *shleshaka kapha*. Combined effects of all these processes manifests the symptoms of *Janu Sandhigata Vata*.

## DISCUSSION

*Samprapti* of *Sandhigata Vata* follows either of two ways viz, *Avarana Janya* or *Dhatu Kshaya Janya* based on the *Nidana*<sup>13</sup>. *Sandhigata Vata* after *Rajonivritti* can be understood under *Dhatukshayajanya Samprapti*.

According to classical literature the lifespan of an individual is divided into *Baalavastha* (childhood), which lasts up to the age of 16 years, *Madhyamavastha* (young and mid age), which lasts from the age of 16 years to 60-70 years; and *Vridhdhavastha* or *Jeernavastha* (old age), which refers to the period after 60 to 70 years<sup>14,15,16</sup>. Preceding description relates to both the gender, but in females, menopause ensues at

the age of 50. *Bhavamishra* in *Bhavaprakasha* has mentioned the women as *Taruni* (ever young) up to 32 years and *Adhirudha* (middle aged) up to fifty years, after which she is *Vridhdha* (old lady)<sup>17</sup>. *Sushruta Samhita* in *Shareera Sthana* mentions menstruation starts at the age of twelve and continues in appropriate period (every month) stops at the age of fifty when the body is fully grip of senility<sup>18</sup>. This coincides with the *Parihani* stage of life<sup>19</sup>. In *Parihani Avastha*, there will be decline seen in factors seen in *Vridhdhi stage*<sup>20</sup>. *Astanga sangraha* mentions the *Madhyama Vaya* as *Pitta* dominant stage of life<sup>21</sup> preceding to *Vata* dominant phase of life<sup>22</sup> called as *Vardhakya*. Hence, *Parihani* stage of life (40-60) is considered as *Pitta Vata* dominant stage of life, where degenerative diseases like *Sandhigata vata* will emerge. With advancing age, there is gradual diminution in the qualities of *Dosha*, *Dhatu*, *Mala*, *Agni* and *Oja*<sup>23</sup>. *Ksheeyamana Dhatu* is mentioned as the *Lakshana* of *Parihani Avastha*<sup>24</sup> which explains about the degeneration process of *Dhatu* and *Upadatus*. *Sushruta Samhita* in *Sutrasthana* mentions *Jara* as *Swabhavabala roga*<sup>25</sup> and mentions it as *Nishprathikriya*<sup>26</sup>. *Rajonivritthi* occurs in *Jarapakva Shareera* at the age of 50<sup>27</sup>. *Kala*, *Vayu*, *Swabhava* and *Jaravastha* as the biological stimulants which are common for both *Jara* and *Rajonivritthi*. The aging will induce generalized *Dhatukshaya* vice a verse to *Vata vridhdhi* (increased *Laghu*, *Ruksha*, *Khara guna* and *Vishada guna*) and *Kapha Kshaya* (decreased *Guru*, *Snigda guna*), which in turn causes *Karshana*, *Rukshana*, *Shoshana* of *Dhatu*s, and causes *Kapha Kshaya* and *Vata Vridhdhi*<sup>28</sup>. Both these conditions together will cause *Rasa-Rakta dhatu kshaya*.

*Artava* is an *upadhatu*, formed from *Rasadhatu* within a month after proper metabolization of *Raktadhatu* by its *Dhatvagni* and *Bhutagni*<sup>29</sup>. *Charaka Samhita* in *Chikitsa Sthana* mentions *Arthava rakta* as the *Upadhatu* of *Rasa dhatu*<sup>30</sup>. *Arthava* can be understood as *Dhatu (Upadhatu) Rupa Arthava* (ovarian hormones), *Beeja Rupa Arthava* (ovum) and *Rajasrava Rupa Arthava* (menstrual flow).

*Kashyapa Samhita* in *Shareera Sthana* mentions as the fruit that is going to be formed due to transfor-

mation is not visible in present flower and the fire that is going to be aroused in future cannot be felt in wood, similarly the *Shukra* in *male* and *Arthava* in *female* are visualised after attaining proper time and growth<sup>31</sup>. *Bhavaprakasha* in *Poorvakhanda* mentions *Dhatu Rupa Arthava* causes *Bala*, *Varna*, *Pusti* which indicates the anabolic action of hormones<sup>32</sup>. *Dalhana* in his commentary on *Sushruta Samhita* mentions formation and accumulation of *Arthava* causes gradual development of breasts, uterus, vagina and vulva<sup>33</sup>. The above contexts describe *Arthava* as ovarian hormones.

*Sushruta Samhita* in *Sutrasthana* mentions that the menstrual blood in women is also produced by *Rasa* which continues from the age twelve to fifty<sup>34</sup>. This context mentions *Arthava* as *Rajasrava Rupa Arthava* (menstrual flow).

*Arthava Nivritthikala* (menopause) is induced at the age of fifty<sup>35</sup>. After 50 years, because of the age, the integrity of the *Dhatu*s is lost leading to slow deterioration of *Dhatu*s, *Raja* and *Sihanya*<sup>36</sup>. This explains the pathogenesis of *Vata Vyadhi* in general due to aging which coincides with menopause. *Sharangadhara Prathamakhanda* describes the formation of *Arthava* from the *Rasa Dhatu*. Hence, *Vata vridhdhi* due to ageing causes *Rasadi Dhatu Kshaya* and *Arthava Kshaya*.

All sex hormones are originated from cholesterol. Cholesterol being subjected to different catalytic reactions of different enzymes transformed into progesterone and estrogen<sup>37</sup>. Like *Shukradhatu* in males, *Arthava* in females imparts *Bala*, *Varna*, *Pushti*<sup>38</sup> and hence it is considered as *Dhatu*, *Dhaturupa arthava* is considered as ovarian hormones.

*Ekakala Dhatu Poshana Nyaya* by *Arunadatta* mentions as, the *Ahararasa* percolates into all the *Srotases* at a time uniformly; it can be presumed that all the *dhatu*s are nourished simultaneously without any time gap<sup>39</sup>. Where in *Jara Avastha*, *Ahara Rasa* does not nourish the *dhatu*s because of geriatric decay. *Ahara rasa* though normally nourishes all the *dhatu*s, its function is deficient in the old in whom it only supports life<sup>40</sup>. Subsequent to which the *Kshaya* of *Dhatu* including the *Dhatu Roopa Arthava* will be

manifested, which in turn aggravates the *Vata Dosha*. Estrogen plays an important role in the growth and maturation of bones as well as in the regulation of bone turnover in adult bones. Estrogen deficiency after menopause leads to increased osteoclast formation and enhanced bone resorption. Estrogen plays an important role in maintaining the homeostasis of articular tissue. Therefore, estrogen protects against joint degeneration. Glycosaminoglycan synthesis, an essential component of connective tissue, is one reason estrogen has chondroprotective effects. In addition, estrogen prevents chondrocyte damage caused by reactive oxygen species by inhibiting cyclooxygenase 2 mRNA expression in particular chondrocytes. Estrogen and progesterone receptors were found in synovial cell lining. In menopause estrogen deficiency induces cancellous as well as cortical bone loss. Highly increased bone resorption in cancellous bone leads to general bone loss and destruction of local architecture because of penetrative resorption and microfractures. Estrogen deficiency in postmenopausal or perimenopausal women culminates in OA which is an Osteoporotic phenotype in early stages of OA followed by reduced bone turn over and further subchondral sclerosis in the late stages of OA. Estrogen deficiency may result in elevated serum IL-6, IL-1, TNF alpha which accelerates OA progression<sup>41,42,43</sup>.

According to *Charaka Samhita*, *Nidana Sevana* which are *Dosha Guna Samana Ahara Vihara* and *Dhatu Viguna Ahara Vihara*<sup>44</sup> aggravates *Vata* and this *Prakupita Vata* gets accumulated in *Rikta Srotas* and gives rise to various generalized and localized diseases. *Chakrapani Dutta* in his commentary *Ayurveda Dipika* on *Charaka Samhita* comments on the word *Rikta Srotas* as *Snehadi Guna Kshaya*. The aggravated *Vata dosha* causes *Upashoshana* of *Rasadhi dhatus*. *Sushrutha Samhita* mentions in wherever the aggravated doshas circulating in the body get stuck up due to the vitiation of *srotus*, the disease is manifested there<sup>45</sup>. This explains the manifestation of disease in *ekadesha* (in that particular place) which as mentioned by *Charaka Samhita* in *chikitsasthana*<sup>46</sup>. Hence *Vata dosha* produces specific diseases because

of the specific nature of the causative factors and the seat of manifestation<sup>47</sup>.

In the manifestation of *Janu Sandhigata Vata* the *Prakupita Vyana Vata* travels along and gets lodged in *Janu Sandhi* where there is already existing *Khavaigunya*, resulting in diminution of *Sleshaka Kapha*. The aggravated *Vata Dosha* also impacts on surrounding structures of the knee joint like *Sira*, *Asthi*, *Kandara*, *Snayu*, *Shleshmadhara Kala* and *Shleshaka Kapha* and manifests as *Janu Sandhigata Vata*. Hence, based on *Dosha Dhatu Mala Samsarga* (the combination of dosha and dhatu, *Ayatana vishesha* (the specific site of the disease being *Janu Sandhi*) and *Nimittha vishesha* (according to causative factors) the manifestations of symptoms are understood based on *Tallingatvat* (characters of dosha), *drstaphalatvat* (observing pacification of *vata*) and *Agamat* (scriptural evidence)<sup>48</sup>. *Vata dosha* having the *Atma Rupa* of *Roukshya*, *Shaithya*, *Laghava*, *Vaishadhya*, *Amurthatwa*, *Anavasthitatwa* moves all over the body and causes *Sushiratwa* (porosity) of the bones<sup>49</sup>. One of the functions of dhatu is *Shareera dharana* (bear/supports the bodies frame). Among the *dhatu*, *asthi dhatu* is specific for *Shareera dharana*. According to the principle of *Ashraya- aashreyee bhava*<sup>50</sup>, *Asthi dhatu* is the seat of *Vata dosha*, and *Asthi* and *Vata* are inversely proportionate to each other<sup>51</sup>. Increase of *Vata* vitiating factors will cause decrease of *Asthi dhatu*. With advancing age vitiating *Vata* leads to *Kshaya* of *asthi dhatu* (decreased bone density). When the *Vata Dosha* vitiates *Snayu* and *Khandara*, it manifests as difficulty in flexion and extension of the knee joint. *Kshoba* to the *Shleshmadhara kala* manifests as *Shotha*. *Shleshma Kshaya* in the knee joints causes *Atopa*. Hence, the *Lakshanas* of *Sandhigata vata*: painful flexion and extension of knee joint, swelling, crepitus and diminution of functions of the knee joint is manifested.

## CONCLUSION

*Sandhigata Vata* after *Rajonivritti* can be understood under *Dhatukshayajanya Samprapti* where *Kala*, *Vayu*, *Swabhava* and *Jaravastha* acts as the biological stimulants which are common for both *Jara* and *Ra-*



jonivritti. *Arthava. Nivritthikala* (menopause) is inducing at the age of fifty coinciding with the *Parihani avastha* of ageing, the role of *Rasa dhatu* and *Arthava* in the degenerative phase of life and its impact on *Samprathi* of *Janu Sandhigata Vata* throws light into the understanding of *Samprathi* of *Janu Sandhigata Vata* after *Rajo nivritthi*. Taken together, the identification of variations of *Janu Sandhigata Vata* and specific stages of *Janu Sandhigata Vata* should be considered alongside therapeutic interventions, which may lead to clearer conclusions regarding role of multimodal treatment approach on post-menopausal OA and its progression<sup>52</sup>.

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