



<b>Dr. Sonia Meend*</b>	MD Scholar, Dept. Of Sharir Rachana, National Institute Of Ayurveda, Jaipur. *Corresponding Author
<b>Dr. Sunil Kumar</b>	Professor & H.O.D, Dept. Of Sharir Rachana, National Institute Of Ayurveda, Jaipur
<b>Dr. Neha Udainiya</b>	Assistant Professor, Dept. Of Sharir Rachana, National Institute Of Ayurveda, Jaipur

**ABSTRACT** *Dhatu* forms the pillars which uphold the body. For the proper functioning of the body, the *dhatu poshana prakriya* must go relentlessly. *Majja dhatu* is the *Sneha Bhaga* of *Medo Dhatu*. Osteoporosis can be studied on the grounds of *MajjaKshaya*. *MajjaKshaya* is the *Kshaya* of *Majja Dhatu* which can be viewed with two perspective i.e. *Anuloma Kshaya* and *Pratiloma Kshaya*. *MajjaKshaya* is the *Kshaya* of *Majja Dhatu* which can be viewed with two perspective i.e. *Anuloma Kshaya* and *Pratiloma Kshaya*. *Anuloma Kshaya* a type in which *Dhatu Kshaya* takes place in order of nutrition of *Dhatu* i.e. from *Rasa Dhatu*, *Rakta Dhatu* and so on. In *Pratiloma Kshaya*, the *Kshaya* of *Dhatu* takes place in a retrograde fashion i.e. from *Shukra Dhatu*, then *Majja Dhatu*, effects of which can be ultimately seen on *Asthi*. Effective line of treatment can be formulated for osteoporosis if it is studied with this perspective, besides focussing on the mineral aspect of bone.

#### SUMMARY

*Majja* is considered to be one of the *Dhatu* of the human body. *Acharya Charak* has explained 18 types of *Kshaya* out of which *MajjaKshaya* is one of them. The clinical features of *Kshaya of Majja* are the ones which are affecting the general framework of *Asthi*. So a study need to be conducted to explore this type of *Kshaya* as per the concept explained by our ancient scholars. *Majja Kshaya* can be studied as *Anuloma & Pratiloma Kshaya* i.e. progressive and retrogressive *Kshaya of Dhatu*. The concepts are explored and elaborated in this study.

**KEYWORDS :** *Majja Dhatu*, *Majja Kshaya*, *AsthiKshaya*, osteoporosis

#### INTRODUCTION

*Dhatu* forms the pillars which uphold the body. For the proper functioning of the body, the *dhatu poshana prakriya* must go relentlessly. Any hinderance in this process, may proceed as the *Kshaya* (diminution) of these *dhatu* which may have drastic counter effects on body.

*Majja-kshaya* is also a counter effect of hinderance in the *Dhatu Nirmaana Prakriya*. It can be either due to hinderance in the *Jathragni* or *Dhatwagni* from which it is formed.

Osteoporosis is a metabolic disease which is characterized by low bone mass and micro-architectural changes in the bone tissue resulting in disturbed equilibrium in bone metabolism i.e. bone formation and bone resorption which leads to increased bone fragility and higher risks of fractures.

There is no direct terminology mentioned for osteoporosis in *Ayurveda* classics but *Lakshana* (clinical features) of *Majjakshaya* show a direct effect on the *Asthi Dhatu* in a drastic manner which show striking similarities with the features of osteoporosis. This work is an attempt to study *Majjakshaya* in purview of “osteoporosis”.

#### DISCUSSION

*Acharya Sushruta* describes *Kshaya* as the “*Swapramana Han*” i.e. loss in the one's normal amount. *Acharya Charaka* mentioned 18 types of *Kshaya* in *Sutrasthana* but only clinical features of these are studied there.<sup>[1]</sup>

In *Ayurveda* classics, there is no direct term as Osteoporosis, but the *Lakshanas* (features) mentioned by the *Acharyas* under the heading of *Majjakshaya* show striking similarity with the features of the disease. *Majjakshaya* is also not directly assumed but the concept of *Dhatu Kshaya* has been majorly discussed in our classics under the reference of *Rajyakshma*.

*Acharya Sushruta* and *Acharya Madhav* both proposed *Shosha* as a synonym of *Kshaya* and *Rajyakshma*. *Dhatu Kshaya* are studied as *Anuloma* and *Pratiloma Kshaya*. *Madhav Nidaana* followed *Acharya Sushruta* while describing *Samprapti* of *Kshaya*. While describing *Samprapti* (pathogenesis) of *Kshaya*, *Acharya Vijayrakshita* states that along with depletion of *Dhatu* and vitiation of all *Srotas* (channels) of body with *Dosha*, if *Trilinga Lakshana* (prodromal triple signs) are present the only it is termed as *Rajyakshma*, otherwise it is just considered as *Dhatu Kshaya*.<sup>[2]</sup>

#### Samprapti Ghataka of Majjakshaya

##### Dosha –

- *Vata Pradhana* (*Vyana, Samana*)
- *pachaka pitta*

##### Dushya –

- *Asthi Dhatu*
- *Majja Dhatu*
- *Meda Dhatu*

##### Agni –

- *Jathragni*
- *all five Bhutagni*
- *Dhatwagni – mainly Asthi Dhatwagni, Majjagni*

##### Srotas –

- *Medovaha Srotas*
- *Asthivaha Srotas*
- *Majjavaha*

##### Srotodushti

- *Sanga*

##### Udbhava Sthana

- *Amapakvashya sthana (koshtha)*

##### Vyakta Sthana

- *Asthi*

##### Adhishthana

- *Asthi and Majja*

##### Rogamarga

- *Madhyama Rogamarga*

##### Roga Prakriti

- *Chirkaari (long lasting)*

##### Sadhya-Asadhya

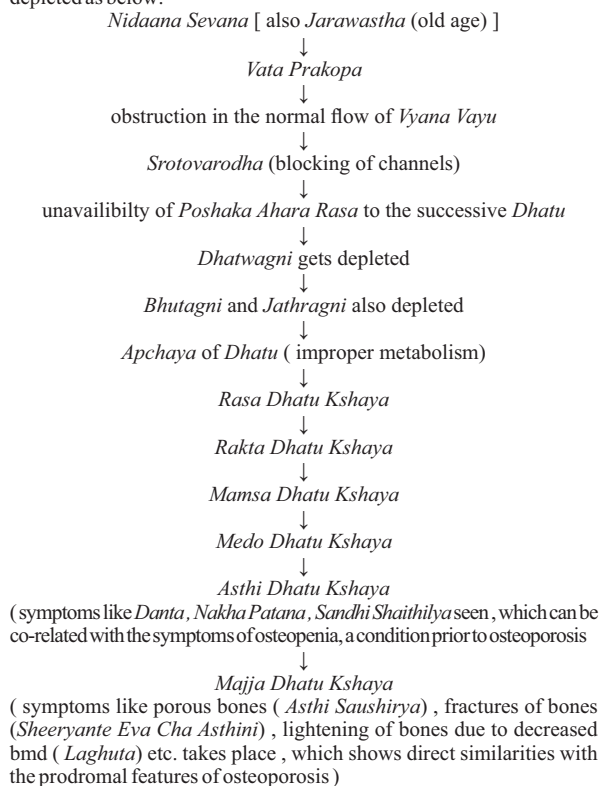
- *Yapya*

##### Anuloma Kshaya

It is a type in *Dhatu Kshaya* takes place in order of nutrition of *Dhatu* i.e. from *Rasa Dhatu*, *Rakta Dhatu* and so on. It occurs due to improper nourishment of *Dhatu* due to obstruction of *Poshaka Ahara Rasa Vaha Dhamani* because of the obstructed *Vyana Vayu* or due to unavailability of *Poshaka Ahara rasa* to

successive dhatus which ultimately have effect on *Chaya-Upchaya*(metabolism) of *dhatus* and ultimately leads to their *Kshaya*.

The possible *Samprapti* (pathogenesis) of *Anuloma Kshaya* can be depicted as below:



#### Pratiloma Kshaya

In context of *Majjakshaya*, another pathogenesis that could be studied is *Pratiloma Kshaya*. In this *Kshaya*, the *Kshaya* of *Dhatu* takes place in a retrograde fashion i.e from *Shukra Dhatu*, then *Majja Dhatu*, effects of which can be ultimately seen on *Asthi*. Here in this context, *Shukra* term denotes for both male and female *Shukra*, and not only male *Shukra*. *Artava* of female might also be considered here. In female, *Artava* is used to denote the “*Shukra*”.

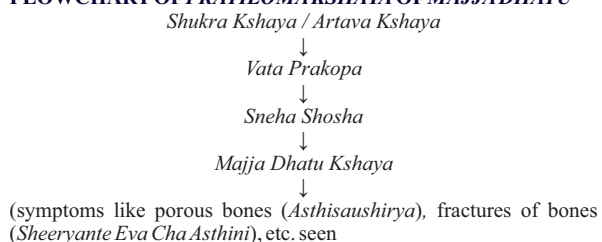
In female, *Artava* is used to denote the “*Shukra*”.<sup>[3]</sup>

When *Kshaya* of *Shukra* is observed, both the forms of *Shukra* i.e *Dhatu* and *Beeja* forms should be taken into consideration.

*Artava* in young women, due to growing tissues and maturing body, gets accumulated in *Garbhashya* and gets excreted every month, if fertilization does not occur. But in old age, due to degenerating and matured *Dhatu*, this *Artava* undergoes *Kshaya* (diminution).<sup>[4]</sup>

This *Kshaya* of *Shukra Dhatu* again leads to *Shosha* of the *Sneha Bhaga* of body and leads to *Pratiloma Gati* of *Vayu*. This leads to the retrograde *Kshaya* of *Dhatu*. Due to this, *Majja Dhatu* gets affected first. This *Majja Dhatu Kshaya* has drastic effects on the *Asthi Dhatu* and leads to their retrograde *Kshaya*, symptoms like *Asthi Saushirya*, *Asthi Laghuta*, *Asthi Dourbalya* etc. are markedly seen.<sup>[5]</sup>

#### FLOWCHART OF PRATILOMAKSHAYA OF MAJJADHATU



Osteoporosis can be viewed as a consequence of disturbed equilibrium in bone metabolism i.e. bone formation and bone resorption in which

rate of bone loss exceeds the rate of formation of bones.

There is no direct terminology mentioned for osteoporosis in *Ayurveda* classics but if we take a closer look then *Lakshana* (clinical features) of *Majjakshaya* as mentioned by our ancient scholars show striking similarities with the clinical symptoms of osteoporosis.

As per modern concept, Osteoporosis can be of 2 types –

1. TYPE I – It is commonly known as post-menopausal osteoporosis. It is due to estrogen deficiency. Most common in female.
2. TYPE II – commonly known as senile osteoporosis. Occurs due to ageing.

*Acharya Sushruta* has given detailed description of *Dhatu kshaya* under the roof of *Shosha* which encompasses the pathogenesis of type I and Type II of osteoporosis and *Acharya Madhava* as *Rajyakshma*.

The mechanism of *Anuloma Kshaya* can be viewed as parathyroid hormone mechanism of the body. It is mainly secreted when Serum Calcium concentration declines in blood (<7.6 mg/dl). parathyroid hormone receptors are mainly located on bones, kidney, CNS, Pancreas. PTH is a powerful modulator of Bone marrow stem cells (BMSC). PTH converts Red Bone Marrow to Yellow Bone Marrow/BMAT (bone marrow adipose tissue) and increases osteoclastic bone resorption leading to osteoporosis. PTH secretion tends to increase during ageing leading to increased osteoporotic changes and weaker Bone health in old age.

On the other hand, *Pratiloma Kshaya* encompasses the features of Post-menopausal osteoporosis in female over 50-60 years of age.

Estrogen receptors are expressed by cells in the bone marrow. Estrogen plays a crucial role in secretion of osteoprotagerin (a decoy receptor) that binds with the RANK ligand inhibiting the binding of RANKL with RANK receptor, thus inhibiting the stimulation and production of osteoblast formation. In postmenopausal women, estrogen deficiency leads to increased production of IL-1, IL-6, PNF, RANKL by stromal cells of bone Marrow.

All of them have a combine effect on more expression of osteoclast progenitor in marrow leading to increased Osteoclastogenesis and resultant osteoporosis.

#### CONCLUSION

Therefore we can say that *Majja dhatu* is the *Sneha Bhaga* of *Medo Dhatu*. Osteoporosis can be studied on the grounds of *MajjaKshaya*. *MajjaKshaya* is the *Kshaya* of *Majja Dhatu* which can be viewed with two perspective i.e. *Anuloma Kshaya* and *Pratiloma Kshaya*. *Anuloma Kshaya* a type in which *Dhatu Kshaya* takes place in order of nutrition of *Dhatu* i.e. from *Rasa Dhatu*, *Rakta Dhatu* and so on. It occurs due to improper nourishment of *Dhatu* due to obstruction of *Poshaka Ahara Rasa Vaha Dhamanis* because of the obstructed *Vyana Vayu* or due to unavailability of *Poshaka Ahara rasa* to successive dhatus which ultimately have effect on *Chaya-Upchaya*(metabolism) of *dhatus* and ultimately leads to their *Kshaya*. In *Pratiloma Kshaya*, the *Kshaya* of *Dhatu* takes place in a retrograde fashion i.e from *Shukra Dhatu*, then *Majja Dhatu*, effects of which can be ultimately seen on *Asthi*. Therefore, rather than just concentrating on the mineral aspect of bone, if these pathogenesis regarding the disease are taken into consideration, then an effective line of treatment can be formulated for this disease.

#### CONFLICTS OF INTEREST : NONE

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