

Concept of *Majja Dhatu* and its significance in the Diagnosis and Management

Athira V¹, Mariya Husain^{2*} and Atul P Ambadi³

^{1,2,3}Department of Kriya Sharir, Parul Institute of Ayurved and Research,
Parul University, Vadodara - 391760 (India)

¹Email ID - drathiravenugopal@gmail.com

²Email ID- drmariya24@gmail.com

³Email: athulambadi007@gmail.com

***Corresponding Author:** Mariya Husain

Email ID- drmariya24@gmail.com.

Mob No: +918329771085.

Abstract

The basic physiological constituent for the human body's survival as per Ayurveda is Dosha, Dhatu, and Mala. The role of Dhatu is Dharana (giving support). *Majja Dhatu* is the sixth Dhatu among seven. According to Acharya Charaka, Majjadhatu is produced once Vata causes porosity in Asthi Dhatu and the unctuousness of Meda files in it. This finally is *Majja Dhatu*. It plays a significant role in the process of red blood cell production. Saraktameda and Majja are explained by Acharya Susrutha. The metabolic by-products (Malas) resulting from the transformation of *Majja Dhatu* are considered to be Netra (eyes), Twak (skin), and Vit Sneha (unctuousness of feces) The quantity of *Majja Dhatu* is one Anjali. According to Acharya Charaka, Majjavaha Srotas is a channel that facilitates the circulation of Majja Dhatu, which is crucial for maintaining the structural integrity and functionality of bones. As per Ashtanga Samgraha, Parva (joints) and Asthi (bones) are identified as the Moolasthanas of the Majjavaha Srotas. Here is an attempt to conceptualize study *Majja Dhatu*, and its importance in the diagnosis of disease and management based on the description in Ayurveda classics.

Key words : *Majja Dhatu, Majjavaha Srotas, Dhatu Poshana.*

Ayurveda, the science of life, describes health as a balanced state of Dosha, Dhatu, Agni, and Mala, in which all bodily functions are harmoniously regulated, and the soul, sense organs, and mind exist in a state of holistic well-being¹⁷. Dosha are Vata, Pitta, Kapha²⁹. Agni like Bhootagni & Dhatuvagni³². The seven Dhatus in the body are Rasa, Rakta, Mamsa, Meda, Asthi, Majja, and Shukra²⁶, and Mala are Mutra, Pureesha³⁰. Any change in the normal state of these leads to disease conditions. So proper formation, functioning, and maintenance of all these are very important in keeping the body healthy. The formation and nourishment of Dhatu are explained through Dhatuposhana Nyaya¹⁵. Just as Dosha, Dhatu, and Mala are essential for maintaining the body's homeostasis, Srotas are equally important, as they serve as the channels for their transportation. *Majja Dhatu* is derived from Asthi Dhatu through the action of Majjadhatuagni, which metabolizes the Poshaka Asthi Dhatu. The human body's physiological aspect can further be understood with the help of the concept of Srotas. Comprehending Srotodushti, along with its Nidana (causative factors) and Lakshana (clinical features), is crucial for accurate diagnosis. "Sushruta Samhita states that even though diseases caused by injured Srotas (Viddha Srotas) are considered incurable, treatment should still be initiated". Acharya Charaka and Acharya Susrutha differ in their interpretation of Abhyantara Srotas, particularly regarding Majjavaha Srotas, with Charaka providing a clear description of the Srotas responsible for Majjadhatu Vahana, whereas Susrutha does not offer such an explanation." The Srotodushti lakshanam explained helps in diagnosing the disease related to it. This article will help to

understand about Majjadhatu, Majjavaha srotas, the disease related to it and its management.

The data was collected from Ayurveda and modern books, different journals, Authentic websites, Reputed Magazines, Authentic works, Manuscripts, Sanskrit dictionaries etc.

Literature Review :

In the sequential process of *Dhatu Poshana*, *Majja Dhatu* is formed as the sixth tissue (*Utharothara Dhatu Poshana*). Its formation is explained in Grahani Dosha Chikitsaadyaya of Charakasamhita and its Upadhatu (by-product) is explained by Acharya Sharangadhara in Poorvakhanda. Symptoms of increased and decreased Majjadhatu are described in Doshadhatu-malakshyavrudhivijnaneeya adhyaya of Susruthasamhita sutrasthan. The concept of Srotas is elaborately explained in Charaka Samhita, Vimana Sthana (5th chapter - Srotovimanam); Sushruta Samhita, Sharira Sthana (5th chapter - Sharira Sankhya Shariram and 9th chapter - Dhamani Vyakaranam Shariram); and Ashtanga Hridaya, Sharira Sthana (3rd chapter - Angavibhaga Shariram). The Samhitas elaborate on key aspects such as Srotomoola, Srotodushti, Hetu, and Lakshana of various Srotas—collectively referred to as Srotoviddha Lakshana—which are crucial for disease diagnosis. Similarly, understanding Dhatuvaha Srotas is also essential for accurate diagnosis. In Rogabhisagjitiyam vimanam of Charaka samhita and Aturopakramaniyaadhyaya of Susrutha samhita gives an explanation of *Majja purushalakshana*.

Derivation of the word Majja :

Majja is Sanskrit word originated from ‘*Majjati Majja*’. Means one who is bathed in fluid or one is embedded in some other constituent. “According to Vachaspath ‘Majj+Ach+TAP’ Form the word *Majja*³.”

Etymology of Majja word :

Majja Dhatu is considered to be the Sara of *Asthi*, just like the Sara found inside the tree *Majja* present inside *Asthi*. The *Virya* (potency) of the kernel should be understood as being similar to that of the fruit.²⁸ As per *Vachaspathyam* and *Shabda Kalpadruma*, *Majja* is described as the oily or unctuous substance located within the *Asthi* (bone).

Variant of Majjadhatu & location :

Majja is the unctuous portion seen inside *Asthi*. It is of two types *Peetamajja* and *Raktamajja*, *Peetamajja* (yellow bone marrow) is seen interior to *Nalakasthi* (long bones), *Raktamajja* (red bone marrow) is seen in rest of *Asthi* and peripheral areas inside *Nalakasthi*. Though *Majja* is similar to *Medas* in structure, by virtue of its specific functions in the body it is considered as a separate *Dhatu*. *Majja* and *Mastulunga* are the two variations of *Snehatva* of *Majjadhatu*. When present in the long bones, it is termed *Majja Dhatu*, whereas in the *Mastiksha* (cranial cavity), it is referred to as *Mastulunga*. Its operation varies depending on the location, however *SnehatvaBhava* stays the same¹⁴.

Formation of Majja dhatu :

While explaining about *Dhatu parinama*,

the food we ingested get metabolizes by *Jatharagni*, *Dhatuvagni*, *Bhutagni* and differentiate to *Saara* and *Kitta* which consecutively develops to *Sukla*. Some scholars opine that *Dhatuparinama* occurs within 24 hours, some opine that it takes 6 days and yet some others, are of the view that it takes about 1 month for *Dhatu parinama*¹³. Through the sequential process of *Uttorottara Dhatu Poshana*, *Majja Dhatu* is formed from the preceding *Asthi Dhatu*.

Vata created physiological space within the *Asthi* and *Meda* filled this hollow space with *Sneha*, which on transformation is known as *Majjadhatu*³¹. “As per *Sharangadhara*, the substance within the cranial bones is termed *Mastulunga* (brain), while that found within the long bones is referred to as *Majja* (bone marrow). The measured quantity of *Majja Dhatu* is stated to be one *Anjali* the quantity of *Majjadhatu* is 1 *Anjali*⁴ which is about 160-170gms. As per modern science the volume of marrow is about 70ml at birth and about 4000ml in adult. “In adults, active marrow is estimated to constitute approximately 3.5–6.0% of the total body weight.” The *CNS* is formed by specific type of lipids known as *glycosphingolipid* or *glycophospholipid*⁸.

Upadhatu :

केशाः (मज्जाः उपधातुः)¹⁹ *Sharangadhara Samhita* is only compendium which mentions *Upadhatu* of *Majja dhatu*. According to this hair of head is the *Upadhatu* of *Majja dhatu* while *Charaka* said that hair of the head as the *Mala* of *Majja dhatu*.

Mala of Majja dhatu :

Mala of *Majjadhatu* are an unctuous

part of excretion of eyes and unctuous part of feces and on the skin^{12,36}.

Functions of Majja dhatu :

मज्जा स्नेहं बलं शुक्रपुष्टिं पूरणमस्थनां च करोति²⁶

The primary functions of Majja Dhatu include imparting unctuousness to Asthi Dhatu and the body, providing strength to both, nourishing the Shukra Dhatu, and filling the cavities within Asthi Dhatu.

Majjavaha Srotas :

Every entity in body is generated in different environment and needs different requirements. It is provided within a specifically designated space meant for that particular entity. There is separate srotas for each body entity, canal for the nutriment in the body and flow or course of water, entities responsible for health and disease.

Charaka acknowledges the existence of Majjavaha Srotas, whereas Susruta does not recognize its presence. Although Majja is distributed throughout the body, it specifically circulates through its own Srotas. The Mula Sthana are considered the principal sites related to Majja Dhatu and should be included among its anatomical locations. The Mula (roots) of the Majjavaha Srotas are considered to be Asthi (bone) and Santhi (joint)⁹. The designation of Asthi Dhatu as the Moola of Majja is justifiable, as it is the preceding Dhatu in the sequence; however, the identification of Sandhi as its main site or Moola remains somewhat unclear. Hypothetically, Asthi, being hard, tends to become brittle; to maintain its

durability, the presence of Sneha (unctuousness) is essential, while Vata, by creating porosity, finds refuge within it.” Dhatu prior to Asthi is Meda and subsequent to Asthi is Majja. There must be a form of interaction or exchange between the Meda Dhatu located outside the bone and the Majja Dhatu present within the bone. In routine such mechanism always active to keep homeostasis of body. There can be waning and increment in qualities of body entities depending upon the everyday diet too. The causes of affliction of Majjavaha srotas are crushing type of injury, excessive consumption of Atyabhishyanda substance, injury, squeezing, Viruddha Sevana⁵.

Applied Physiology

Symptoms of increased Majja dhatu :

Anganam gouravam (feeling of heaviness of body), Netra gouravam (feeling of heaviness in eyes), Parva sthoola— swelling of interphalangeal and metacarpophalangeal joints, clubbing of the fingers and arumshika²¹. An excessive increase of Majja leads to a sensation of heaviness throughout the entire body¹⁷.

Symptoms of decreased Majja dhatu :

Excessive diminution of Majjadhatu in the body gives rise to some signs and symptoms like Asthi sousheerya (osteoporosis), shiryanta (thinness), weakness, lightness, and pricking types of pain to bone and other phalangeal joints. Apart from this is also cause vertigo, blurring of vision³³. At last bones are always impaired with the disease due to Vata Dosha².

Majjasara purusha Lakshana :

Majjasara purushas are characterised by soft but strong body. They will be smooth complexioned, soft spoken, and will have broad, long and spherical joints. They will be blessed with longevity of life, strength, comprehensive ability, wealth, knowledge, offspring and high repute. Not slim, possesses great strength, has a melodious and pleasant resonant voice, and displays auspicious features, they are also lucky and have big eyes¹⁷. Two points need explanation in this, the word Lucky is used for enjoyment of health. Big eyes are interpreted as large, efficient eyes. As eyes are located inside the bone, Majja becomes directly related with them since Majja is Dhatu inside the bone. Since eyes are exposed to external environment, it needs unctuous covering for protection. Majjamala is formed as the unctuous component of the excretory by-products (Mala) of the eyes. Majjadhatu should be strong enough to supply large surface of eye, Hence Majjasara person could be bestowed with big eyes.

Majja pradoshaja Vikram :

Excessive vitiation of Majja Dhatu leads to various signs and symptoms in the body, including ruk parvan (pain in the phalangeal joints), bhrama (giddiness), murccha (fainting), tamo darshana (sensation of darkness before the eyes), arumsha (deep-seated abscesses in the joints that are difficult to manage), as well as heaviness in the eyes and other parts of the body, including the conjunctiva^{20,37} etc. Apart from this it also causes Majja-gata jwara, majjgata vata, prameha, kushtha, masurika, rajayakshma etc.

Dosha, Dhatu, Mala, and Agni constitute the fundamental regulatory systems of the body that maintain homeostasis. The seven Dhatus play a vital role in sustaining bodily functions and are nourished through their respective channels. The concepts of Dhatuvaha Srotas and Dhatuvagni, along with their roles in tissue formation and nourishment, are elucidated through the principle of Dhatu Poshana Nyaya²⁵. According to Dhatuposhana nyaya, the tissues are nourished and replenished in a sequential manner beginning from the Rasa Dhatu to the last one Shukra Dhatu. The superior and most refined form of a Dhatu is referred to as Saara. Bala of an individual can also be assessed by Saara Pareeksha³⁴.

Majjadhatu is the sixth Dhatu to be formed after Asthidhatu in uttrotardhatu-utpati sequence. Acharya Susruta states that Saraktameda is found within all the bones of Anu-Asthi (small bones), whereas Majja is predominantly located within the larger bones. Bone marrow can be correlated as Majjadhatu, playing a significant role in erythropoiesis. Bone marrow, a smooth, jelly-like tissue, is composed of adipocytes and hematopoietic tissue, dispersed throughout the trabecular bone matrix and surrounded by vascular sinuses." Depending on where in the body they are, bone marrow cavities can be either trabeculated or non-trabeculated. Traditionally, bone marrow is divided into two main types: red bone marrow and yellow bone marrow, which differ in their vascularity and composition. Yellow bone marrow primarily consists of adipocytes and contains a high concentration of carotenoid pigments within its fat cells. Yellow bone marrow is composed of 80% fat, 15% water & 5% protein. Yellow bone marrow has minimal vasculature, consisting primarily

of a few capillaries and a continuous basement membrane, while red bone marrow is densely populated with erythrocytes and haemoglobin.” Hematopoietic cells and fat cells make up red marrow. Although its chemical makeup might vary, it normally consists of 40-60% lipids, 30-40% water & 10-20% protein. The creation of bodily blood cells is carried out by the red bone marrow, which is also very vascular and contains a huge network of sinusoids. The chambers of the skull, sternum, scapulae, vertebrae, ribs and pelvic bones contain red bone marrow²² *i.e.*, it is present inside the cancellous portions of bones, primary site of haematopoiesis. In adults, it constitutes up to 4% of the total body mass. The billions of blood cells bone marrow produce per day is transported to the systemic circulation through vascular sinusoids which are permeable in nature. In adults, blood cells of all lineages—whether myeloid or lymphatic—are exclusively produced in the bone marrow.”. The lymphoid cells produced in the marrow have to migrate to certain specific lymphoid organs like thymus to mature functionally. The division of bone marrow into red and yellow is based on respective prevalence of haemopoietic cell vs. fat cells. In the new born, the entire bone marrow will be almost the “red” marrow (haematopoietically active) which stereotypically changes into the yellow marrow as age progresses due to regulatory mechanisms not understood until now, but best understood as a ‘stabilization of marrow. In adults, red bone marrow remains active predominantly in the central skeleton, including the pelvis, sternum, cranium, ribs, vertebrae, and scapulae, as well as in the epiphyseal regions of long bones such as the femur and humerus. Additionally, during chronic hypoxic conditions, the body has the capacity to convert yellow marrow back into

red marrow to enhance hematopoietic activity.

Causes of affliction of Majjavaha Srotas can be categorised in to two ways Abhigathaja and Aharaja. The causes like Utpesha, Abigatham, Prapedana caused due to external factors and intake of food items with causes Abishyanda and Virudhaahara sevana all these produces symptoms like pain in joints, giddiness, altered state of consciousness, appearance of darkness in front of eyes, deep seated ulcers in joints. Many of the presentations of Majja pradoṣaja rogas are surprisingly similar to either malignancies like leukaemia, aphasia or myelomas as also to decreased presentations of Majjadhatu. Arunshi in Parva which are having Sthulamula, Deep seated ulcers in joints. These types of ulcers are usually observed in the lower limb either unilateral or bilateral. As per Ayurveda Asthi and Majja are the srothomoola of Majjavaha srotas. The ulcer may develop due to crushing type of injury or by Abigatham or by Squeezing hard may can lead to the formation of ulcers. Along with the other Aharaja factors may leads to the wound goes to deeper rooted. The formation of reddish carbuncle having broad base along the joints which resist treatment may present in case of increase of Majjadhatu.

Applied aspect of Majjadhatu :

In the pathogenesis of different disease Majja Dhatu is involved like Majjameha in Vataja Prameha. In Chaturthakajwara, when the vitiated Dosha afflict Majja Dhatu²⁷. While explaining the eight locations of Vruṇa it is mentioned³⁵. When vitiated Vata affects the Majja, it causes splitting pain in the bones and joints, arthralgia, muscle weakness, insomnia,

and persistent pain.¹⁰ And the patient gets relief on pressing with the hand (gentle massage)⁷. There is a strong correlation between the concepts of Madhumeha and Majjadhatu. Study found that Madhumeha (diabetes mellitus) is substantially associated with vitiation of Majjadhatu, which might result in problems such diabetic peripheral neuropathy⁶.

Management :

Bone marrow-derived stem cells hold extensive potential for various applications in the field of regenerative medicine. It is also widely held that the Rasayana therapies of Ayurveda done after relevant Panchakarma therapies, works by rejuvenating cells of bone marrow¹ For thousands of years, animal bone marrow has been utilized globally both as a culinary ingredient and as a medicinal substance Charaka states that consumption of Majja of animals improves strength, Shukra, Kapha and Meda²³. Hence, management of severe diseases of bone marrow like leukaemia's or aplastic anaemias heralds transplanting the bone marrow, now a day, stem cells harvested from bone marrow are used to treat certain neurological illnesses, after transformation into functional neural. According to Acharya Charaka the disease related to Majjadhatu can be treated with diet of sweet as well as bitter taste, indulging in sexual intercourse, exercise and timely elimination of Dosha in proper quantity.

The above discussion outlines that Ayurveda provides a scientific perspective on all aspects of Majja Dhatu. Analysing the Guna and Karma of Majja Dhatu reveals its role in maintaining the structure of Asthi in coordination

with Vata. Though Vata and Majja are distinct entities with opposing qualities, both coexist within the Asthi.

They both enhance one another within the Asthi.

Among the five Nidana of Majjavaha Srotodushti; Utpesha, Abhigathaja, and Prapidana can influence Majjavaha Srotas immediately. Atyabhishyanda and Viruddha Aahara gradually impact Majjavaha Srotas after influencing Purva Dhatu. Disorder in the Majjavaha Srotas can manifest as either Majja Kashaya (depletion of Majja) or Majjavridhhi (excessive increase of Majja).²² Understanding the properties, Formation, and interrelationship of Majjadhatu with other body systems provides valuable insights in maintaining health and treating the disease within the principles of Ayurveda.

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