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Majja Dhatu: The Ayurveda Aspect of Nervous System

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ABSTRACT

Majja is one out of four *Chatusneha* (different type of lipids) as well as one of *sapta Dhatu* present inside bone or bone case (*Sthulashthi*). The brain is enclosed in skull and spinal cord is enclosed in vertebral column. While the brain and spinal cord make up the central nervous system. So, the *Majjadhatu* is associated with the entire nervous system. *Chakrapani* also described “*mastishkam sirahstho majja*”. *Indu teeka* says *Medodhatu*, turns into *Mastulunga* and also modifies into *Majja*. So, *Majjadhatu*'s appearance is like *Avilina* (uncondense) *Ghrta*) in the form of *Mastulunga* or *Mastishka* i.e. brain (CNS). Glycolipids (heterolipid) are the cerebrosides, gangliosides nervon oxynervon etc. out of them Cerebroside's common form i.e Galactocerebroside found primarily in neuronal cell membrane. Gangliosides are sialic acid containing glycolipids that are also abundant in the nervous system phosphosphingosides (sphingomyelin) is the component of myelinsheath of nervous system. Therefore, *Majja* is specialized lipid called heterolipid (glycosphingolipid or glycopospholipid) forming the Central nervous system as an anatomical aspect (However PNS as snayu) along with vata karma (conduction) as physiological aspect.

Key Words *Majja, Nervous System, Mastulunga Glycolipid Cerebrosides Mastishka Sphingomyelin*

INTRODUCTION

Dosha, Dhatu and *Mala* are the basic elements of the body. *Dhatu* and *Updhatu* both makes the whole basic tissues of the body. There are seven *Dhatu*s out of which *Majja* is the sixth *Dhatu* formed from *Majjaansh* of *asthiDhatu* and it has the *Shukraansh* for next *ShukraDhatu*. *Majja* is the tissue which is enclosed within the bones.

Review of majja

Majja means which is in boney cavity¹. *Majja* is one among four type of *sneha* (*ghrita, taila, vasa, Majja*) which provide strength. *Mastulunga* is also

*Majja Dhatu*² with its appearancelike *Avilina* (Uncondensed) *Ghrta*). *Chakrapani* also described “*mastishkam sirahstho majja*”³. There is predominancy of *Jala Mahabhuta*⁴. *MajjaDhatu* performs physical strength, especially of the bones and is useful for oleation. It is heavy and unctuous⁵. Special function of *Majja* is *Purana* (filling of Bones).

UpDhatu (Secondary Tissue) of *Majja*- According to *Sharngadhar, keshis* the *Updhatu* of *MajjaDhatu*⁶; but according to others *kesha* is *updhatu* of *asthi*. Two different opinion for considering *kesha* as *Updhatu* (biproduct) to



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different *Dhatus* may be because *kesha* is the intermediate biproduct of *asthi* and *Majja*.

Mala (Waste) of Majja Dhatu are Sneha (oily substance) excreted through eyes, and skin⁷. *Majja Pradoshaj Vikara* are Pain in Joint, vertigo, syncope etc.

Characteristics of Majja Sara

Purusha: Individuals having the dominancy of *Majja* are characterised by softness of organs, strength, unctuous complexion and voice and robust long and rounded joints. Such individuals are endowed with longevity, strength, learning, wealth, knowledge, progeny and honor⁸. According to *Sushruta*, big eyes (*Maha-Netra*) are a differentiating symptom of *Majja Sarata*⁹.

Chief Symptoms: *Asthi Saushirya*, *Asthi Daurbalya*, *Asthi Laghuta*, *Asthi Nistoda*, *Pratam Vata Roga*, *Alap Shukrata*, *Bhrama*, *Timir Darshnam* etc. occur in *Majja Kshaya*.

Lipid and the nervous system

Lipids are classified into three groups (i) simple or homolipids (ii) Complex or heterolipids and (iii) derived lipids. On further division, Simple lipids are triglycerides and waxes, Heterolipids are glycolipids or glycosphingolipids, proteolipids, and phospholipids.

The nervous system is the organ with the second largest concentration of lipids. Nervous tissues contain about 50 to 60% of their dry weight as lipids, and approximately 35 to 40% of these lipids are polyunsaturated fatty acids (PUFAs) rich phospholipids¹⁰. The four major classes of glycosphingolipids are the cerebroside, sulfatides, globosides and

gangliosides. Galactocerebroside are found predominantly in neuronal cell membranes¹¹. Gangliosides that is also more abundant in the nervous system¹². Study had been done suggesting that *GalNAcT* gene affects gangliosides decreased myelination, neural degeneration and synaptic remodeling¹³.

As elements of the nervous system, ocular tissues such as the optic nerve and the neural retina display similar characteristics. Phospholipids represent about two-thirds of total lipids in these structures and are characterized by species rich in PUFAs¹⁴. The ratio of different PUFAs influences neurotransmission processes for normal brain function. This ratio can be affected by dietary intake¹⁵. This shows linkage between *majja dhatu* with its mala (*akshi vit*)

DISCUSSION

Majja is the specialized lipid (heterolipid called cerebroside, ganglioside neuron etc as *sneha*) which is enclosed by bone (*asthi*). Encloser may be either in the form of case made up of skull and vertebral column containing CNS or bone marrow, this specialized lipid (*Majja*) is modified form of lipid (*meda*) when lipid is combines with carbohydrate and phosphate groups as glycosphingolipid or glycosphingolipid. It has been also described in *Induteeka* that *Medo Dhatu* turns into *Mastulunga* and it is *Medo Dhatu* again which turns into *Majja Dhatu*. *Mastulunga* is present inside the flat bones of skull. *Chakrapani* described that



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brain (*mastishka*) situated in head region is *Majja* and it is *sirogata sneha.dalhana* also described that *Majja* is just like solid state of lipid present in head region as *mastulunga*. In case of *Majjakshaya* vataroga indicated towards the nervous system also in *majjasaarpurusha* various characteristics like *mahotsaha* (excitement) *kriyavant* (impulse of movement) *gambeerswara* (intellectual speech) moves towards same. So, *medodhatu* (lipid) modifies to *majja* (specialized lipid) as *mastishka* (brain). *Majja Dhatu* is specialized lipid forming central nervous system (except Periferal nervous system). Periferal nervous system is correlated with *snayu* by many scholars.

Vitiation of *dosha* on *Majja Dhatu*- *KaphaDosha* vitiation results in excessive *Majja Dhatu* formation, which is of low quality. *MajjaDhatu* becomes more dense and thick, thus affecting the *Prakrut Vata Karma* resulting in slower movement of nerve impulses. This is observable in the mind by its slower activity i.e. slower processing of sensory information and slower response times.

-*Pittadosha* vitiation results in minimal to moderate *Majja Dhatu* formation which is highly efficient. Impulse moves effectively through the nervous system with quick Processing and response times.

-Vitiation of *Vatadosha* results in irregular *Majja Dhatu* formation and the tissue that is formed is of low quality and fragile. Nerve *impulse* becomes irregularly sometime hyperactivity or hypoactivity. In addition, motion may be jerky, as occurs in tics and some tremors.

The health of the *MajjaDhatu* can also be understood by observing the quantity of exudate produced from the eyes in the morning. Dry and crusty exudates of eyes point toward *vatadosha* imbalance. A large quantity of oily or mucousy exudate is the indication of *Kapha* imbalance. Yellow exudate which may be a little oily shows the involvement of *Pittadosha*.

CONCLUSION

Majja is specialized lipid called glycosphingolipid or glycopospholipid forming the central nervous system and *Snayu* forms the Periferal nervous system is an anatomical aspect along with *vata karma* (conduction) as physiological aspect.



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REFERENCES

1. Shabdakalpdrum,
2. Vagbhata, Ashtanga Hrudaya, with Ayurveda Rasayana Sanskrit commentary by Hemadri, Vidyotini, hindi commentary by Kaviraja Atrideva Gupta, edited by Vaidya Yadunandana Upadhyaya, reprinted in 2010, Chaukhamba Prakashan, Varanasi, UttarSthana chapter 23/30.
3. Agnivesa: Caraka Samhita: Rev. by Caraka and Dradhabala with Ayurvedipika commentary by Cakrapanidatta: reprint (2011) Chaukhamba Surbharti Prakashan : Varanasi, Siddhi Sthana chapter 9/23
4. Susruta: Susruta Samhita: with commentaries Nibandhasamgraha by Dalhana and Nyayacandrika by Gayadasa: edited by Vaidya Yadavji Trikamji Acharya Chaukhamba Surbharti Prakashan, Varanasi: reprint (2012), Sutra Sthana chapter 15/10
5. Agnivesa: Caraka Samhita: Rev. by Caraka and Dradhabala with Ayurvedipika commentary by Cakrapanidatta: reprint (2011) Chaukhamba Surbharti Prakashan : Varanasi, Sutra Sthana chapter13/17
6. Sharangdha: Sharangadhar Samhita, with Hindi Commentary Jiwanprada By Dr Smt. Shailaja Srivastava, Editon -4;2005, Chaukhamba Orientalia, Varanas, Poorva Khanda, Chapter-5/16-17
7. Agnivesa: Caraka Samhita: Rev. by Caraka and Dradhabala with Ayurvedipika commentary by Cakrapanidatta: reprint (2011) Chaukhamba
8. Agnivesa: Caraka Samhita: Rev. by Caraka and Dradhabala with Ayurvedipika commentary by Cakrapanidatta: reprint (2011) Chaukhamba Surbharti Prakashan : Varanasi, Vimana Sthana chapter8/110
9. Susruta: Susruta Samhita: with commentaries Nibandhasamgraha by Dalhana and Nyayacandrika by Gayadasa: edited by Vaidya Yadavji Trikamji Acharya Chaukhamba Surbharti Prakashan, Varanasi: reprint (2012), Sutra Sthana chapter 35/16
10. Sastry PS (1985) Lipids of nervous tissue: composition and metabolism. Prog Lipid Res 24: 69–176.
11. Michael W King, PhD, Last modified: July 25, 2019
<https://themedicalbiochemistrypage.org/sphingolipids.php>
12. Yu RK, Nakatani Y, Yanagisawa M. The role of glycosphingolipid metabolism in the developing brain. J. Lipid Res. 2009;50(Suppl):S440–S445.
13. Robert K. Yu, Structures, biosynthesis, and functions of gangliosides—An overview, Journal of oleo science
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3684167/>
14. Fliesler SJ, Anderson RE (1983) Chemistry and metabolism of lipids in the vertebrate retina. Prog Lipid Res 22: 79–131.
15. Marianne Haag Essential Fatty Acids and the Brain, the Canadian journal of psychiatry April 2003.