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A CRITICAL REVIEW ON DUCHENNE MUSCULAR DYSTROPHY THROUGH AYURVEDA–A PRACTICAL APPROACH

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ABSTRACT

DMD is one among the most common Muscular dystrophy. It is life threatening condition & shortens patient's life substantially. DMD is characterized by progressive symmetrical muscular weakness that affects proximal muscles more than distal, often accompanied by calf muscle pseudo-hypertrophy. It affects every 1: 3600 live male births due to mutation in dystrophin gene. According to Ayurveda, this can be coincide under *adibalapravruttavyadhi.* The pathogenesis occur due to *beejabhagadusti* (hereditary) or *garbhopaghatkarabhavas*(sudden mutation). *Vata*as the prime *dosha* to cause neurological disorders, vitiates *rasa, rakta, mamsa, jala, agni & oja* and leads to gradual progression of muscle wasting, necrosis to systemic involvement. Until now corticosteroids are the only pharmacological palliative management available for DMD, but these drugs are associated with many side effects. *Panchakarma* has proven its space in the field of neuro-muscular conditions, and is most effectively practiced specially in children. So, this article is an attempt to understand the clinical background of the disease and propose an effective treatment plan that can control the progression of disease and improvise the life outcome & expectancy.

KEYWORDS: *Beeja Bhaga Dushti*, Duchenne Muscular Dystrophy, Dystrophin, *Panchakarma.*

INTRODUCTION

Muscular dystrophies (MD) are a group of muscle degenerative disorders pertaining to neuromuscular system. These results in increasing weakening and progressive breakdown of skeletal muscles over the time. Among the major form of MD, Duchenne muscular dystrophy (DMD) & Becker muscular dystrophy (BMD) combine called as DBMD are the most succeeding dystrophies to be suffered by children all over the globe. The estimated prevalence of DBMD was 1 in every 7,250 males aged 5 – 24yrs. [1] Amongst this, prevalence of DMD was three times higher than that of BMD. DMD is one of the serious form of recessive X – linked inherited disorder primarily affecting skeletal and cardiac muscles. It affects 10.2 per 100,000 live male birth.[2] With the increasing prevalence of disease in young children, multiple centers pertaining to special care are also foundered in India.[3] This genetic defect is due to lack of a muscle protein called Dystrophin or any sudden mutation in Dystrophin gene (locus Xp 21.2). After birth, the Sequencing of presentation starts with mild delayed milestones during toddler period, often toe – walking, difficulty to raise from floor and frequent falls. By the age of 5 years a marked disparity between physical ability and surrounding peers occur. During 2nd decade of life; respiratory, cardiac & orthopedic involvement takes place and without any medical intervention, leads to a cost of life expectancy (at the age of 18 to 20 years).[4] In Ayurveda, the disease cannot be directly correlated to any of a particular disease entity. This pathogenesis can be attributed under the concept of *adibalapravritta vyadhi* as it occurs due to the *beejadusti*and *aatma karma*[5] (self-deeds) which leads to *khavaigunya* of *mamsavahastrotas* causing *dhatvagni* impairment.[6] MD can be considered as an imbalance of *vatadosha*, *saptadhatu* (basic elements for formation of *garbha*both as functional & structural - to the level of *dhatwagni*) and*ojas* considering its progressive degeneration to systemic involvement. The cardinal feature is *chestahani* (decreased mobility), which indicates decrease in *chalaguna*. Recent advancements are addressing towards multi-systemic complications, improving the quality of life and life expectancy are been continuously revolutionized by both supporting and medical domains. According to Ayurveda, the drugs possessing properties like *Medhya* (memory boosting), *Balya* (strenthening), *Rasayana* (rejuvenative), *Agnivardhana* (digestive & carminative) & *Vatadoshahara* are administered both internally and externally as a principle guideline for nourishment, followed by strengthening and rejuvenation of *mamsadhatu*. Various treatment advances are been undertaken, currently FDA has accepted EXONDYS 51™ (eteplirsen) injection[7] which is useful for DMD children with a confirmed deletion / mutation of Exon 51 only.[8] Stem cell therapy and gene therapy are still in the preliminary

stages of development. A common obstacle facing all these therapeutic approaches is the difficulty of penetration or delivery into the central nervous system and so absence of specific treatment makes it more important to consider complementary and alternate approach of management.

AIMS AND OBJECTIVES

1) To study etio-pathogenesis of DMD through both modern and Ayurveda perspectives.
2) To promote Ayurvedictreatment principles in managing DMD.

MATERIALS AND METHODS

This review was done by compiling the classical Ayurveda literature, Ayurveda Pediatric books, modern pediatric books, magazines, research journals, thesis and dissertations Pub med, WHO guidelines for Muscular Dystrophy, AIIMS guidelines, CCRAS database, websites etc.

DISSCUSION

Ayurveda and DMD: According to Acharya *charak*[9], the very definite cause for defective progeny is vitiation of *beeja* & *beejabhaga*. The part in *beejabhaga* is vitiated that *anga* originating from the part of *beeja* will be deformed and this can be related to geneticdiseases due to chromosomal disorders. *Adibalapravruttavyadhi* explains about both *matruja* (maternal chromosomal defect) and *pittruja* (paternal chromosomal defect) as two separate etiologies for *sahajavikara*. The cause of DMD in male child can be understood as said by Acharya charaka[10], that *Shukra and shonita* plays the major part in formation of *garbha*, which contains both paternal& maternal characteristics.But, the determination of *prakruti, panchamahabhuta, doshasanghatana* of *garbha* also depends upon *garbhopaghatkarabhavas*. So, when a mother consumes aggravating factors, thus triggers *vatadosha*, either destroying the fetus or causing any deformity to *matrujabhava*. So, this can be related to the cause of disease effecting X chromosomes and thus causing DMD in male child and females as carrier.

Role of *vata, rasa, rakta, mamsadhatu, jala, agni* and *ojas*in DMD

Mamsadhatu is formed by conjoining of *rasa*, *rakta* with *vata*, *jala* & *agni*.[11] Acharya *vagbhata* says, *vata* is the main cause for birth of deformed child. When it gets vitiated, it dries up the channels of *rasa* etc *dhatu* (lack of nourishment to fetus) leading to newborn suffering from further *vatavyadhi* (neurological disorder) or born with birth defects. These

both can be considered as the reason for dystrophy in children as a genetic origin.[12] During *dhatunirmana* (tissue formation), *katuawasthapaka* gets vitiated due to derangement in *agni*thus afflicting *Vata*,produces *vishammahabhuta;* which in turn leads to improper formation of *dhatu*. Further, *dhatuparmanu*is also produced abnormally because of these *vishammahabhuta* and now the destruction occurs by *swabhava* (natural). This finally detoriates the *oja*causing respiratory & cardiac complications.[13]

***Samprapti*:** The pathogenesis of dystrophy can be understood by *mamsavahasrotodushtivikara*which occur due todefect in *shukra / shonita* (deformity in X chromosome) or vitiated *matrujabhavas* (sudden mutation of gene) leading to *beejabhaga / avayavadushti*. Due to *beejadushti*, *vatavaishamyata* (disproportionate) occurs,causing improper formation of *mamsadhatu* by the influence of *dhatwagni* of *rakta* & *mamsa*.[14] Due to decrease in *dhatwagni* there is formation of *ama* (indigestion) and due to this faulty nutrition it causes progressive degeneration of *mamsadhatu* (muscle tissue).[15] While *srotorodha* (obstruction due to metabolic waste) produces hypertrophy of particular region and so first occurs as *prokopa* and then depletion of *vata* element takes place. This complex pathogenesis is responsible for progressive muscle wasting and necrosis of muscle fibers.

Roopa: The clinical features can be correlatedas *mamsakshaya*of *sphik* (muscle wasting of thigh), *mamsasphik, uru, janghavrudhi* (hypertrophy of muscles of thigh, chest, abdomen and hip), *gurugatrata* (heaviness of muscles) *adhimamsa* (hyperplasia of muscle), *prabhrutayomamsadoshaja* (inflammation of necrosis of muscle).[16]

***Chikitsa*:** The basic line of management concentrates on correction of *dhatuparinamaprakriya*. Ayurveda considers the significance of *agni*, which is the sole responsible for the formation of *uttarottaradhatu* (every next tissue). Thus correction of this *dhatwagni*, by administering *deepana* and *pachana* drugs in order to strengthen the *dhatu* and further elimination of metabolic waste is to be done.[17] Acharya *vagbhata*, said regarding the usage of *rukshanadravya* for *bruhmhana* treatment modalities; as a pre-operative procedure which helps in expulsion of *srotorodha* and does *sthirikarana* of *anga*.[18] Though *vata* is the prime *dosha* to neurological conditions and basti is considered as *ardhachikitsa* and ultimate amongst all but still in conditions like DMD, a multi-dimensional approach should be followed.

The proposed line of treatment for DMD

First line – expel *Srotosodhana– lekhanaaushadhi, dhatwagnideepanapacana* (*rukshana*)

Second line – *Dhatukshayajanyavatavyadhi Chikitsa* (to promote tissue metabolism)

Third line – followed by *Brumhanachikitsa.*

A. Shodhanachikitsa

1. *Deepana* and *pachana* (like *udvartana, pariseka* with *dhanyamla*[18] – at tissue level)

2. *Snehapana*[19]– with *TiktaGruta, Amritprasha Gruta, Indukantam Ghruta, Dashamularasnadi Ghruta*

3. *SarvangaAbyanga*with *Balaashwagadhalakshadi Taila, Mahanarayana Taila, Mahamashadi Taila*[20], *Sahacharaditaila, Prabhanjanataila.*

4. *Swedana (Shastikashalipindasweda*[21], *patrapotlipindasweda*[22], *mamsakizhi*)

5. *Virechana*with *Trivtrut Leha* (best in children).

6. *Basti* (of *brumhana* property) - *Mamsa rasa basti, Mustadiyapana basti*

7. *Anuvasana basti* with*AshwagandhaGhruta, ChangalyadiGhruta*[23]

8. *Nasya*with *Masha Taila, Kshirabala Taila*

B. *Shaman chikitsa*

1. *Kashaya*: - *IndukantamKashayam, BadradarvadiKashaya, GuducyadiKashaya, VidaryadiKashaya, KalyanakaKshiraKashaya, maharasnadikashaya, sahacharadikashaya*.

2. Rasa oushadhi:- EkangaveerRas, SwarnamakshikBhasma, VasantKusumakaraRas, MuktaPishti, ksayakulantakaras

3. *Choorna :-Ashwagandha Choorna*[24], *Trikatu Choorna, Higuvastaka Choorna, Pippali Choorna, Kapikachu Choorna, saddharana choorna*

4. *Vati:- chandraprabhavati* (anti-inflammatory[25]), *GorochanadiVati, PurnaChandrodaya, dhawantaramgulika, rasonadivati, sivagulika*

5. *Arishta :- Ashwagandhaarishta*[17], *Balarishta, dashamularishta, dhanwantararishta*

6. *Rasayana Chikitsa :- Mamsagni Rasayana*[26], *Ajamamsa Rasayana, Lasuna Rasayana, DhatuKalpa Leha*[27], *kushmandaleha*

C. Single drug therapy

*Bala, Shatavari, Ashwagandha, Musta, Haridra, Daruharidra, Arjuna*these are neuro-muscular tonic because of *vatashamana*property.

Mechanism of action of panchakarma on DMD[28]

Abhyanga - It stimulates circulatory system, vasodilatation resulting to nourishment & strengthening of muscles, reduces connective tissue thickening and provide flexibility by decreasing fibrous adhesions from hypertrophied muscles. It has shown reduction in toe walking, relieving contractures, nourishment of atrophied muscles, increasing muscle power and assisting muscle tone.[29] *Swedana* - Fomentation has been demonstrated to produce decrease in gamma activity, which reduces stretch on muscle spindles resultingin decreased muscle spasm. Elevating muscle temperature can also alter strength and endurance. It also result in decreased joint stiffness and increased tissue extensibility, thus facilitating ease of motion and range of movements.[30] *Virechana* - (considered as *bastyaupakarma*) It has detoxification action which leads to better absorption of *bruhmana*&*rasayanadravya* and also improves the *agni*.[31] *Basti*- to be instilled as *karma* / *kaala basti*, considering it as *gambhirdhatugatavikara*.[32] Yapana basti acts as *lekhana*&*brumhana*. It is *medohara*, increases *agni*.[33] It has regulating effect on gutbrain (ENS).[34] *Anuvasanabasti* - It rejuvenates the body and further improves *dhatukshaya* (depletion of body tissue).[35] *Nasya* – has a property of *Manaprasadana* action.[36]

CONCLUSION

DMD is a genetic disorder with no specific treatment in any system of medicine and disease prognosis is unpreventable. This demands the role of an integrated approach. In India, its increasing incidence and with no proper cure, parentswith DMD patients approaches Ayurveda for a better outcome of results. Ayurveda instills a regenerative mechanism in neuromuscular disorders with special concern to *Panchakarma, Rasayana, Rasa oushadhi*etc. These do not proclaim to be curative as DMD is *asadhyaanuvamshikavyadhi,* but can provide a floor for better quality of life with a longer survival.

REFFERENCE

1. Romitti Pa, Zhu Y, Puzhankara S, James Ka, Et Al; Prevalence Of Duchenne & Becker Muscular Dystrophies, Pediatrics 2015, Mar; 135(3): 513-21.
2. S. Ryder et.al; the burden epidemiology, costs & treatment for DMD: an evidence review, orphaned journal of rare disease, published on 26/4/17.
3. Muscular Dystrophy Foundation, Madurai, India (MDF India Is The Only Dpo Of/For Muscular Dystrophy Patients In India Operated With Muscular Dystrophy Resource Center (MDRC) And Indian Association Of Muscular Dystrophy, Solan, Hp, India.

4. Kevin P. Campbell, Three Muscular Dystrophies: Review Loss Of Cytoplskeleton-Extracellular Matrix Linkage, Cell, 1995; 80: 675-679.
5. Agnivesha, Charaksamhita: Text with English translation and critical exposition based on Chakrapani Dutta" sayurveda Dipika by Dr. R. K. Sharma and Vaidya bhagavan das, Chaukamba Sanskrit series office, Varanasi, edition 2009; 3/17: 384.
6. Jain Mukesh D. Mamsagni Rasayana in the treatment of Duchenne Muscular Dystrophy: 28 Patients. Ayurvedic Patrika Nasik (MS) India, 2006; 1(3): 24-29.
7. Sarepta Therapeutics Announces FDA Accelerated Approval Of Exondys 51™ (Eteplirsen) Injection, An Exon Skipping Therapy To Treat Duchenne Muscular Dystrophy (Dmd) Patients Amenable To Skipping Exon, 5119.09.2016. Http://Www.Exondys51.Com.
8. https://en.m.wikipedia.org>wiki>musculardystrophy.
9. Agnivesha, Charaksamhita: Text with English translation and critical exposition based on Chakrapani Dutta" sayurveda Dipika by Dr. R. K. Sharma and Vaidya bhagavan dash, Chaukamba Sanskrit series office, Varanasi, edition 2009; 3(17): 384.
10. Agnivesha, Charaksamhita: Text with English translation and critical exposition based on Chakrapani Dutta" sayurveda Dipika by Dr. R.K. Sharma and Vaidya bhagavan dash, Chaukamba Sanskrit series office, Varanasi, edition 2009; 4(30).
11. Agnivesha, Charaksamhita: Text with English translation and critical exposition based on Chakrapani Dutta" sayurveda Dipika by Dr. R. K. Sharma and Vaidya bhagavan dash, Chaukamba Sanskrit series office, Varanasi, edition 2009, Chikitsa sthan 15/29.
12. Vagbhata, Ashtanga Sangraha: By Dr. Shivapras Sharma, Chowkamba Sanskrit Series Office, Varanasi. 2014; 2(20).
13. Agnivesha, Charaksamhita: Text with English translation and critical exposition based on Chakrapani Dutta" sayurveda Dipika by Dr.R.K. Sharma and Vaidya bhagavan dash, Chaukamba Sanskrit series office, Varanasi, edition sootrasthana 2009; 28/3(12): 16/27.
14. Vagbhata, AshtangaSangraha: By Dr. Shivapras Sharma, Chowkamba Sanskrit Series Office, Varanasi. 2014; 142.
15. Nair P Ramchandran Et Al Pseudo-Hypertrphic Muscular Dystrophy- An Ayurvedic Approach. Journal of Res. In Ayurveda & Siddha 1980; 1(3): 429-437.
16. Susruta, Susrutasamhita, with English translation of text & Dalhana's commentary along with critical notes, vol 1, by P V Sharma, chaukhambhabharatiacademt, re print, sutra 15/9, p : 160, sutra 15/14, p: 163, sutra 24/9, 2004: 256.

17. Agnivesa, Charaka Samhitawith Chakrapannidatta, Ayurveda Dipika, Commentary Reprint Ed, Varanasi Chaukhambha Orientalia 2009; 620.
18. Vagbhata, Astanga Hridayawith ArundattaIn: Kunte Am, Ed. Sarvangasundari, Commentary. Reprint Ed. Varanasi; Chaukhambha Orientalia, 2011; 28: 223-225.
19. Govind das, Bhaishajya Ratnavali, In: Ambika data shastri, ed. Vidyotini commentary. Reprint ed. Varanasi: Chaukhamba Sanskrit sansthan 2001; 396-97.
20. Agnivesa, Charaka Samhita With Chakrapannidatta, Ayurveda Dipika, Commentary Reprint Ed, new delhi, Chaukhambhasurabharatiprakashan 2008; 90-91.
21. Agnivesa, Charaka Samhita With Chakrapannidatta, Ayurveda Dipika, Commentary Reprint Ed, new delhi, Chaukhambhasurabharatiprakashan 2008; 89.
22. Dr. Raghuram Y. S, Podikizhi – churnapindasweda treatment procedure benefits, 2016 www.Easyayurveda.com.
23. Vagbhata, AstangaHridayawith ArundattaIn: Kunte Am, Ed. Sarvangasundari, Commentary. Reprint Ed. Varanasi; Chaukhambha Orientalia, 2011; 594.
24. Govind das, Bhaisajyaratnavali, In; Ambika data shastri, edition vidyotini commentary, re print ed; Varanasi: chaukhambha Sanskrit sansthan, 2001; 301.
25. Dr Krishnamurthy, where to use Ashwagandha choorna, Ashwagandarista, Ashwagandhavaleha and ghruta?, jan 2014, www.suvacha.com.
26. Drjagdevsingh, chandraprabhavati benefits, uses, dosage & side effects, last update jun 2017, www.ayurtimes.com.
27. Jain Mukesh D. Mamsagni Rasayana in the treatment of Duchenne Muscular Dystrophy: 28 Patients. Ayurvedic Patrika Nasik (MS) India 2006; 1(3): 24-29.
28. Dr. L. Mahadevan, Guide to Ayurvedic clinical practice.
29. Chaturvedi Ashutosh, Rao Prasanna n, U Shailaja, M Ashvinikumar. Role of panchakarma in Duchenne muscular dystrophy. IntJ. Res. Ayurveda Pharm 2013; 4(2): 272-275.
30. By Akhoury Gourang Sinha, Principles and Practice of Therapeutic massage Jaypeebrothers medical publishers, Edition: 2nd; 243.
31. Martin FH. Fundamentals of anatomy and physiology chapter 5.4th ed, New jarsy. prentice hall inc.simon & Schuster, 1998; 148-149 & 162.
32. Jain Mukesh D, Yoga Annapurna & pandey MP preliminary study of integrated approach of panchakarma, yoga & Ayurvedic medicine in the management of muscular dystrophy, world health review 2002; 1:1 33-35.

33. Agnivesa, Charaka Samhita With Chakrapannidatta, Ayurveda Dipika, Commentary Reprint Ed, new delhi, Chaukhambhasurabharatiprakashan 2008; 731-32.
34. Vagbhata, Ashtanga Sangraha: By Dr. Shivapras Sharma, Chowkamba Sanskrit Series Office, Varanasi. 2014; 5.
35. U. Shailaja, Prasanna N Rao, K.J. Girish, Clinical study on efficacy of rajayapana basti & Baladi yoga in motor disabilities of CP in children. yr 2014; 35.
36. Agnivesa, Charaka Samhita With Chakrapannidatta, Ayurveda Dipika, Commentary Reprint Ed, new delhi, Chaukhambhasurabharatiprakashan 2008; 621.
37. Agnivesa, Charaka Samhita With Chakrapannidatta, Ayurveda Dipika, Commentary Reprint Ed, new delhi, Chaukhambhasurabharatiprakashan 2008; 26.