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CRITICAL REVIEW ON *KALYANAKA LEHA* WITH SPECIAL REFERENCE TO DELAYED SPEECH.

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ABSTRACT:

Parents great concern is the children's milestone specially speech development. If a child delays speaking then it's a big worry to the parents. If speech delay is not properly handled, it will affect other aspects of their development like social and academic growth. *Ayurveda* being life science gives importance to speech & its related disorders. There is no medicinal treatment to treat such condition in modern science. Speech therapy is a helpful hand for people suffering from delayed speech, but the result may vary from one therapist to another. Hence there is need of drugs or formulations which enhance or accelerate in the treatment modality of such cases. In *Ayurveda*, *Kalyanaka leha* is well known for treating disorders related to speech. Hence an attempt is made in this study to evaluate and understand the mode of action of drugs present in *Kalyanaka leha* with special reference to speech delay.

Keywords: Ayurveda, *Kalyanaka leha*, Delayed Speech.

INTRODUCTION

Speech delay or also called as language delay is a common issue in children during their developmental period. It is affecting millions worldwide and in India, the prevalence of speech–language delay was 2.53% of the children as per the study conducted in 2019[1]. Speech delay refers to delay or difficulty in a child's ability to produce speech sounds or understand & use language appropriately for their age.

Speech depends on coordinated activities of central speech apparatus (cortical and sub cortical centers) and peripheral speech apparatus (larynx, pharynx, mouth, nasal cavities, tongue & lips). All the structures of peripheral speech apparatus function in coordination with respiratory system, with the influence of motor impulses from respective motor areas of cerebral cortex. Development of speech is the association of certain words with visual, tactile, auditory & other sensations, aroused by objects in the external world. Association of words with other sensations is stored as memory. New neuronal circuits are established during the development of speech when a definite meaning has been attached to certain words, pathway between auditory are (area 41) and motor area (area 44) is established. The child attempts to formulate and pronounce the learnt words[2].

A number of medical factors are assessed which are responsible for speech delay like hearing loss, persistent otitis media, seizure disorder, birth asphyxia, LBW, preterm birth, oro-pharyngeal deformity. Among them statistically significant risk factors were birth asphyxia, seizure disorders & oro-pharyngeal deformity[3]. Speech is controlled by three centers, Speech nervous control centers in cerebral cortex, respiratory control centers of brain and articulation and resonance structures of mouth and nasal cavities. Hence any changes in these three will alter the speech production.

In *Ayurveda,* production of vocal sounds or speech is called as '*Vak Pravrutti'*. It is the major function of *Udana Vata*, a sub type of *Vata dosha*. It is responsible for the production of *Varna (letters or vocal sound), Smriti (memory) and Medha (intellectual power)*[4]. There are many formulations explained in classical texts of *Ayurveda* in treatment of diseases related to speech. As per the reference of *Bhaishajya Ratnavali*, one among them is *Kalyanaka leha* which is advised in the treatment of difficulty in speaking, pronunciation & who lack firm voice[5]. As per the study conducted in the year 2012, *Kalyanaka leha* has shown the positive

result for the treatment of *Gadgada* (stuttering). The content of *Kalyanaka leha* are *Haridra, Vacha, Kushta, Pippali, Vishvabheshaja, Ajaji, Ajamoda, Yastimadhu, Saindhava* and *Goghruta*.

MATERIALS AND METHODS

To analyze the properties of the ingredients of Kalyanaka leha, Dravyaguna Vignyana by P V Sharma, Indian Medicinal plants, Volume I-V by Arya Vaidya Sala and Ayurvedic Pharmacology & Therapeutic uses of medicinal plants by Vaidya V. M. Gogte referred. Research updates were browsed through the internet.

Table 1- Properties of ingredients of *Kalyanaka leha*

Sl no	Name of the drug	Part used	Rasa	Guna	Virya & Vipaka	Action on dosha, Srotas, Agni, Dhatu and Mala	Active Principal
1	*Haridra*[6,7,8]	Rhizome	*Tikta, Katu*	*Ruksha, Laghu*	*Ushna, Katu*	*Vatakapha shamaka, Pitta rechaka,Pitta shamaka; Acts on Rasa, Rakta and Meda dhatu; Vishodhani, Shophahara;*	Curcumin,
2	*Vacha*[9,10,11]	Rhizome	*Katu, Tikta*	*Tikshna, Laghu*	*Ushna, Katu*	*Kaphavata shamaka, Pittavardhaka; Acts on Majja dhatu; Medhya, Ahnivardhaka; Kanthaasyarogajith, Asmritihara, Vakswaraprada, Budhiprada, Smritivardhini*	Asarylaldehyde, A- Asarone, B-Asarone, Acorin
3	*Kushta*[12,13,14]	Root	*Tikta, Katu,*	*Laghu, Ruksha,*	*Ushna, Katu*	*Kaphavata Shamaka, Acts on*	Saussurine

			Madhura	*Tikshna*		*Pranavaha srotas, Rakta & Shukra dhatu,Mutravahasrotogami; Rasayana,*	
4	*Pippali*[15,16,17]	Fruit	*Katu*	*Snigdha, Laghu, Tikshna*	*Anushnasheeta, Madhura*	*Vatakaphashamaka, Pitta virodhi; Acts on Rakta, Meda, Shukra, Majja; Smrutyahva, Rasayana, Medhya, Agnivardhani,*	Piperine, Piplartine
5	*Vishvabheshaja*[18, 19, 20]	Rhizome	*Katu*	*Tikshna, Snigdha, Laghu*	*Ushna, Madhura*	*Kaphavatanut; Acts on Rasa, Rakta, Shukra; dhatvagni vardhaka; Svarya, Kanthamaya vinashanam*	Zingiberene, Zingiberol
6	*Ajaji*[21,22,23]	Fruit	*Tikta, Katu,*	*Laghu, Ruksha, Tikshna*	*Ushna, Katu*	*Kaphavatahara,Pitta vardhaka;Acts on Rasa, Majja, Shukra dhatu; Agnivardhaka; Vatanulomana;*	Cumaldehyde
7	*Ajamoda*[24,25,26]	Fruit	*Katu, Tikta*	*Tikshna, Laghu, Ruksha,*	*Ushna, Katu*	*Kaphavatahara,Pitta vardhaka; Acts on Shukra dhatu; Deepana, Vatanulomana*	Anthoxanthins[27]
8	*Yashtimadhu*[28,29,30]	Root	*Swadu*	*Guru, Snigdha*	*Sheeta, Madhura*	*Vatapittashamaka; Acts on Rakta, Majja and Shukra*	Glycyrrizin

						dhatu; Swarakrut, Vruna shodhana, ropana,Rasayana	

Table no 2. Effect on *Samsthana*

Sl no	**Name of the drug**	**Effect on *Samsthana***					
		Nadi	***Pachana***	***Raktavaha***	***Swasana***	***Mutravaha***	***Prajanana***
1	*Haridra[8]*	*vedanastapana*	*Ruche vardhaka, anulomana, pitta rechaka, krimighna*	*Rakta prasadaka, rakta vardhaka, rakta sthapaka*	*Kaphaghna*	*Mutrasangrahaniya, mutra virajaniya, pramehaghna*	*Garbhashaya shodhana, sthanya shodhana and shukra shodhana*
2	*Vacha[11]*	*Medhya, samdnyastapana, aakshepasamana, vedanastapana*	*Deepana, truptighna, arshoghna, krimighna, shula prashamana*	*Reduces raktabhara and hrudaya gati*	*Kasa, shwasahara, kantya*	*mutrajanana*	*Garbhashaya sankochaka*
3	*Kushta[14]*	*Avasadhaka, akshepashamaka, vatahara*	*Deepana, pachana, anulomana, shulaprashamana*	*Rakta shodhaka*	*Kaphaghna, kaphanihsaraka, swasahara*	*Mutrala*	*Shukrashodana, vrushya, garbhashayottejaka, artava janana, sthanya*

							janana
4	*Pippali[17]*	*Medhya, vatahara*	*Deepana, truptighna, vatanulomana, shulaprashamana, mruduvirechana, yakruttejaka, plihavruddhihara, krimighna*	*Uttejaka, rakta vardhaka, rakta shodhana*	*Kasahara, swasahara, hikkanighrahana*	*mutrala*	*Garbhashaya sankochaka, vrushya*
5	*Vishvabheshaja (Shunti)[20]*	*Uttejaka, vatashamaka*	*Truptighna, rochana, deepana, pachana, vatanulomana, shulaprashamana, arshoghna*	*Uttejaka, shotahara, raktashodaka*	*Kaphaghna, swasahara*	*-*	*Vruhya, uttejaka*
6	*Ajaji[23]*	*-*	*Rochana, deepana, pachana, vatanulomana, shulaprashamana, grahi,*	*Uttejaka, shodhaka*	*-*	*Mutrala*	*Garbhashaya shotahara, stanyajananа and vrushya*

			krimighna				
7	*Ajamoda*[26]	*-*	*Vidahi, deepana, vatanulomana, shulaprashamana, krimighna*	*Hrdayottejaka*	*kaphaghna*	*Mutrapravaha ka*	*Garbhashayottejaka, vajikarana*
8	*Yashtimadhu* [30]	*Nadi balya, medhya*	*Chardinigrahana, Trishnanighrahana, vatanulomana, mrudurechana*	*shonitasthapana*	*Kapha nihssaraka, kantya*	*Mutrala, mutraviraja niya*	*Shukravardhaka*

DISCUSSION

Haridra (Curcuma longa* Linn.*)

Studies have shown that administration of Curcumin reproduces the tissues in human models of post traumatic epilepsy and also effective to prevent seizers as well as memory impairment. When administered in combination with piperine could improve its bioavailability and more effective in its antiepileptic activity[31].

Haridra by its *vishodhana* (cleansing of the wound) and *shophahara* (reduces swelling or oedema) property, it heals all inflammatory condition seen in oro-pharyngeal structures which helps in proper articulation and hence improves speech in a child.

Vacha (Acorus calamus* Linn.*)

α & β Asarone showed significant neuroprotective effects and anticonvulsant activity in seizure induced animal models. It also showed cognitive function, antioxidant activity, anti inflammatory activity, GABA agonist & cholinergic actions, protection of neurons among autism induced rats[32]. *Vacha* is having *Medhya, Agnivardhaka, Vatahara, Kanthaasyarogajith (*relieves diseases of throat and mouth*), Asmritihara (*reduce memory loss*), Vakswaraprada (*produce

speech and sounds*), Budhiprada(*increase intellectual power*), Smritivardhini (*increase memory power*)* properties which helps in multifaceted way to produce speech.

Kushta (Saussurea lappa* C. B. Clarke*)

Administration of Costus root extract has reduced the toxicity of the thorium accumulated in brain due to its antioxidant & chelating properties in adult male rats. Petroleum extract of *Saussurea lappa* roots showed potent anticonvulsant activity[33]. Thus *Kushta* is having its action on brain due to its *tridoshahara* and *rasayana (*rejuavanating*)* property, it enhances the brain functions and stimulates the speech center.

Pippali (Piper longum* Linn.*)

The alkaloid of *Piper longum* has shown neuroprotective effects through its antioxidation property[34]. It has action over N-methyl-D-aspartate glutamate receptors which prevent apoptotic neuro degeneration/death in developing rat brain[35]. *Pippali* is having *Smrutyahva* (increase memory*), Rasayana (*Rejuanating*), Medhya (*Intellectual power*), Agnivardhani (*increase the digestive capacity*), Tridoshahara (*pacifies all the three doshas of the body*)* property which helps in memory restoration and increase the intellect of the child.

Shunti (Zingiber officinale* Roscoe*)

In-vitro, In-vivo & clinical trials of ginger & it's different bioactive components are remarkable effective in memory disorders, cognitive impairment, Alzheimer's disease through its antioxidant, anti-inflammatory & anti-apoptosis properties[36]. *Shunti* is *Kaphavatahara, Svarya, Kanthamaya vinashanam(*cures the diseases of throat*),* hence relieves the diseases of *kantha* (throat) and helps in production of speech.

Ajaji (Nigella sativa* Linn.*)

In-vivo, in-vitro & in-silico studies of Nigella sativa demonstrated the neuroprotective benefits in many neurological disorders, induced learning & memory deficits due to presence of alkaloid thymoquinone (TQ), antioxidant & anti-inflammatory activity[37]. *Ajaji* being *vatahara* and *agnivardhaka* it helps in proper formation of *dhatus (*tissues*)* in the body.

Ajamoda (Trachyspermum roxburghianum* Linn.*)

In-vivo & in-vitro study of crude extracts of *Carum roxburghianum* has showed antispasmodic and broncho dilatory effects, which provides pharmacological effects in cases of hyperactivity of gut and airways[38]. This shows that it has its effects on smooth muscles which help for speech production. It also has a pro-cholinergic, antioxidant and hypo-lipidemic activity which shows its action

in the management of cognitive disorders and memory deficits[39].

Yashtimadhu (Glycyrrhiza glabra* Linn.*)

The extracts & flavonoids of *Glycyrrhiza glabra* have its therapeutic effects in reducing neuro inflammatory processes after acute ischemia injury to brain cells & neurodegenerative diseases due to its HMGB inhibitory function, reactive oxygen scavenging and anti-inflammatory activity[40]. *Yashimadhu* is known for its *Swarakrut* property and it also has *Vrana shodhana* (cleansing of the wounds) and *ropana* (healing of the wound) property which helps in healing the diseases of anatomical structures involved in speech production.

Saindhava (Rock salt) and *Go ghruta* (Cow ghee) carry the other drugs and helps to cross through the blood brain barrier and reach the target area to perform their actions.

Most of the drugs of *Kalyanaka leha* are having *ushna veerya (*hot in potency*), Vatakaphahara, Swarya, Agni vardhaka, Medhya* and *Rasayana* property which promote the proper growth and development of the child. They have their multiple actions on both central speech apparatus as well as peripheral speech apparatus. Altogether they have a synergic effect on the target organs and perform their activities.

Kalyanaka leha has shown promising results in nervous disorders by increasing the overall cognitive capacity of the brain either by increasing the metabolism in the brain, by increasing the perfusion of the brain, or by improving the chemical imbalance in the brain[41].

CONCLUSION

Kalyanaka leha enhance or accelerate in the treatment modality of delayed speech cases. It has its effect on almost all the causes which are responsible for the delayed speech. All the drugs present in the *Kalyanaka leha* has their synergic effect on pathological deformities involved in the delayed speech and helps to recover promptly. Clinical application of *Kalyanaka leha* shows promising results in almost all diseases related to delayed speech.

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