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A COMPREHENSIVE REVIEW OF *KACHA*: IMMATURE SENILE CATARACT

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ABSTRACT

Immature senile cataract, commonly referred to as *Kacha*, represents an early stage of cataract in the aging population. Characterized by partial lens opacification, *Kacha* leads to gradual visual impairment, which can significantly affect the quality of life if left untreated. It is one of the leading causes of blindness in the world now a days. The pathophysiology of *kacha* (immature senile cataract) involves oxidative stress, protein aggregation, and altered lens metabolism, all contributing to the gradual opacification. While risk factors such as aging, ultraviolet exposure, diabetes, and genetic predisposition play a role, the exact mechanisms remain poorly understood. As such, early detection, close monitoring must be observed in the management of senile cataracts. Clinically the symptoms of *Kacha* can be correlated with Immature Senile Cataract. In modern science surgery is the only treatment available in cataract. Though much research has been and is being done to find an alternative to surgery in the conventional system of medicine, no satisfactory option has been found to date. In *Ayurveda* our *Acharyas* have mentioned various procedures like *anjanas, aschyotana, pariseka, tarpana* to delay *kacha* or arrest the procedure of opacification which can be useful in senile immature cataract. This paper reviews classical *Ayurveda* texts and their commentaries to understand senile cataracts and *Kacha* better.

KEYWORDS: *Kacha*, Cataract, *Lens*, *Drishti*, *Patala*, *Timira*, *Linganasha.*

INTRODUCTION

Cataract is defined as loss of transparency of lens. The word 'CATARACT' has been derived from the Greek word 'KATARRAKTES' which mean 'waterfall'.[1] Its transparency may be disturbed due to degenerative process leading to opacification of lens fibers. Senile cataract is the leading cause of blindness according to the World Health Report, 1998. The prevalence of cataract blindness would decrease, the absolute numbers of cataract blind would increase from 7.75 million in 2001 to 8.25 million in 2020 due to substantial increase in the population above 50 years in India.[2] Minassian and Mehra estimated that for India alone 3.8 million people become blind from cataract each year.[3]

Rupagrahana vikriti lakshana (visual disturbances) is pathognomonic to all *dristigata rogas.*[4] *Acharya Sushruta* described a separate chapter for *Drishtigata Rogas* in *Uttaratantra*. *Kacha* comes under the *Drishtigata Roga*s. *Kacha* is one such eye disease, which starts from *Avyakta Darshana (Timira)* and ends in complete loss of vision i.e. *Linganasha*. *Acharya Vagbhatta* states that when *Doshas* localize in *Tritiya Patala*, *Kacha* develops. *Kacha* is pigmentation of *Drishti* in which gradual loss of vision occurs. *Timira* involving the third *Patala* of *drishti* causes the development of *raga* in *drishti* and is also named *Kacha*, while that involving the fourth *Patala* is called *Linganasha*. *Acharya Vagbhatta* mentions that *drishti* declined in the seventh decade with an average life expectancy of 100 years.[5] According to *Sharangdhara*, among the ten factors hampered one in every decade of life, *drishti* is reduced or impaired by the sixth decade.[6] This might be due to multiple age-related and degenerative causes like presbyopia, cataracts, age-related macular degeneration, etc. There is no separate mention of the condition, such as senile cataracts. But based on its clinical signs and symptoms, it resembles fitting into a progressive condition among *drishtigata rogas.*

The only management option for cataracts to date in conventional systems of medicine is different types of surgical extraction of lens matter. Any alternative to this can greatly help the healthcare system and national economy. Further, it will be safer and more acceptable to the population than surgical extraction. In India, all cataract surgeries are not sight restoring surgeries as nearly 40-50% surgeries are performed in individuals with a vision >6/60 in the better eye.[7] It has been estimated that, if the onset of cataract can be delayed for ten years, the number of cataract operation would decline by 45 percent. Therefore, to find an

alternative to surgical extraction of lens matter through *Ayurveda*, the first step is to understand the etiopathogenesis of cataracts in terms of Allopathic science and *Ayurveda*. A detailed study of classical *Ayurveda* texts and their commentaries was conducted to understand the concepts of *Kacha* correctly, and then clinical interpretations were made. Various textbooks and journals of contemporary science were studied for the basic understanding of senile cataracts. Then, a possible correlation between the etiopathogenesis of senile cataracts and its stages from the *Ayurveda* perspective was made.

AIM AND OBJECTIVES

AIM: To explore the classical *Ayurveda* and allied literature for understanding the fundamental concept of *Kacha* w.s.r to Immature Senile Cataract.

OBJECTIVES

- To define and describe the clinical features of *Kacha* (immature senile cataract)
- To compare pathophysiology of *Kacha* and stages of senile cataract.

MATERIAL AND METHODS

Classical *Ayurveda* text books, modern text books and journals related to senile cataract *(Kacha)* were analysed for understanding the management of *Kacha* (Immature Senile cataract).

Dristi, Lens and Cataract

The anatomical explanation of *drishti* given by *Acharya Sushruta* reveals it has a shape resembling *masuradala matra* (red lentil).[8] Surprisingly, the term ‘lens’ was derived from the word ‘lentil’. *Drishti* is said to have *vivarakriti* (perfectly transparent- allowing the light rays to pass but not having holes). This explanation of *drishti* points towards the crystalline lens. Various factors are known to be responsible for the transparency of crystalline lens, and once the transparency is lost, it is called a cataract. If this loss of transparency occurs by the age of or above 45 years, it is referred to as senile cataract. Senile cataracts are classified into three stages: immature, mature, and hyper-mature based on the percentage of opacified lens fibers.[9]

Kacha and stages of Senile Cataract

Timira, *Kacha* and *Linganasha* are the progressive stages of disease, occur by vitiation of *Netra Patala* and explained as a terrific disease that obstructs the vision. *Timira* is partial obstruction of the vision,*Kacha* is pigmentation of the *Dṛişhti* in which vision is moderately

obstructed and *Linganasha* is completely obstructed vision. Though, the ancient *Acharyas* differ in naming the various stages but all are agreed that if *Timira* left in situ leads to *Kacha, Kacha* if unattended turns to *Linganasha.* Normally, the four *Patalas* are responsible for '*rupagrahana'* (perception of vision). If these *Patalas* are affected by *kupita-dosha*, it results in '*rupagrahana-vikriti'* (abnormal perception of vision), which is pathognomonic of all the *drishtigata-roga*. The presence and absence of features related to the involvement of *Patalas* in *Timira/Kacha/Linganasha* and other *drishtigata roga* respectively, differentiates them. According to *Acharya Vagbhatta.*[10] when *Doshas* reaches the *Tritiya patala* it is known as *Kacha* and it is a pigmentation of *Drishti* in which gradual loss of vision occurs.

Similar to the early stages of cataract when it affects the first *Patala* of *drishti*, *timira* first causes mild visual disruption. When the second and third *Patalas* of *drishti* are affected by *Timira*, the symptoms gradually become more severe and manifest as floaters, polyopia or diplopia, decreased colour sensitivity, etc. The colouration of the *drishti* (likely lens) appears once the third *Patala* is involved.[11] This phase is equivalent to the immature cataract stage. The *natirudha* and *atirudha avastha* of *Linganasha* can be closely correlated with the mature and hyper-mature stages of cataracts, respectively. Identification of *dosha* is made based on the colour of objects perceived and *Drishti-mandala* colouration.

Timira-Kacha-Linganasha is the different stages of the same disease based on the involvement of *Patalas*. When the *dosha* are still in the first and second *Patalas*, there is no coloration of the *drishti* since there is no *Rakta* in these *Patalas*. *Rakta* and *dosha* being *balavattara* are what cause the manifestation of *raga* (colour) upon attaining the third *Patala*. Thus, *Kacha* is the name of this stage. *Patalagata dosha* can be correlated to different stages of cataracts. *Prathama Patalagata Timira* can be correlated to early cataractous change like lamellar separation, second *Patalagata Timira* to further progression- stage of incipient cataract, third *Patalagata Timira* to immature stage and fourth Patalagata Timira/*Linganasha* to mature and hyper-mature cataract.

Table 1: Cataract stages possible corelation according to *Patalas*

Patalas	**Cataract Stage**	**Features**
Prathama Patala	Lamellar separation, early cataract	Only mild visual symptoms
Dvitiya Patala	Incipient stage, progression from early	*Aragi Timira* (*Alpa Raga)* and other symptoms like glares and changes in colour perception
Tritiya Patala (Kacha)	Immature Senile Cataract	Greyish-white pupillary glow (*Ragi timira*) and other symptoms

Chaturtha Patala (Linganasha)	Mature Senile Cataract	Minimal vision with perception of light and perception of rays (*Na-Ati Rudha)*
	Hyper-mature Senile Cataract	Total blindness (*Ati-Rudha/ Pragadha Timira*)

Based on the pathogenesis involved and the site of the beginning of opacification, senile cataract is classified into nuclear, cortical and posterior sub-capsular.

In the pathophysiology of nuclear sclerosis type of cataract, associated with dehydration and compaction of nucleus resulting in a hard cataract.[13] The fluid regulation (*ambuvaha-sroto-avalambana*) and *Vyana Vata* impairment (*dhatu tarpana* and *gati*) that results in the stiffness of cytoplasm appear to be related to the impairment of *Samana Vata's* function.[14] The reduced and oxidised glutathione exchange rate from the cortex and nucleus is diminished, leading to impaired repair of oxidative damage. This can be attributed to the deficient function of *Prana Vata* and *Samana Vata*. Thus, the pathophysiology of nuclear cataracts reveals the causative *dosha* is *Vata* (*Samana-Vyana-Prana*). Moreover, the opacifying lens's yellowish-brownish colour in nuclear cataracts correlates with *Vataja Kacha's aruna varna* (*Pitta* and *Kapha* may be in *anubandha* form). Since the center of the opacity is where the monocular diplopia usually occurs (a single object appears double when a *dosha* is in the center of the *drishti*).[15]

When cortical cataracts occur, a collection of fluid forms between the separated cortical lens fibers; if this accumulation persists, it results in early opacities with a clear area between them. At that location, *Prakupita Kapha* disrupts the *Vata flow.* Then, when their actions are disrupted, *Vyana Vata* (*srotoshodhana*, pulling fluid out of cells), *Udana Vata* (*srotopurana*, bringing fluid into the cell), and *Samana Vata (ambu avalambana*, fluid regulation and balance) enter the picture. Thus, it appears that *Kapha* is the dosha responsible for cortical cataracts. Moreover, the white spokes observed in cortical cataracts bear a resemblance to the pandura colour of *drishti* in *Kaphaja Kacha*, and the generated vacuoles are comparable to the water-collecting lotus leaf described in *Kaphaja Kacha*.[16] Thus, cortical cataracts can be well correlated to *Kaphaja Kacha.*

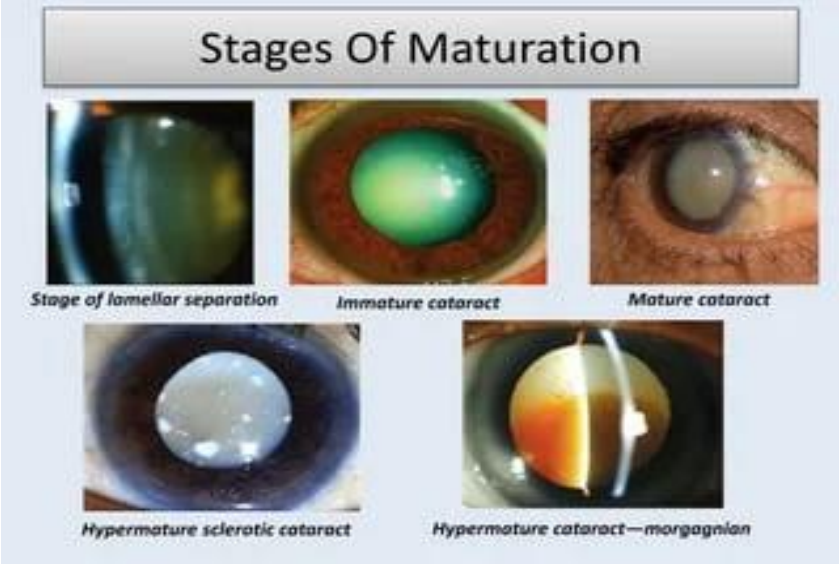

Table 2: Maturation of cortical cataract and *dosha* involvement

Stages of Cortical Senile Cataract	**Pathogenesis** [17]	***Dosha* and Function involved**
Stage of lamellar separation	Demarcation of cortical fibres owing to their separation by fluid.	*Kapha (Ambukarma)* *Vyana (srotoshodhana), Udana (srotopurana), Samana (ambu-avalambana)*
Stage of incipient cataract	Early detectable opacities with clear areas between them	*Kapha* *Vyana (srotoshodhana), Udana (srotopurana), Samana (ambu-avalambana)*
Immature Senile Cataract (ISC)	Opacification progresses further; greyish white but clear cortex is still present, so iris shadow is visible	*Kapha* *Vyana (srotoshodhana), Udana (srotopurana), Samana (ambu-avalambana)*
Mature Senile Cataract (MSC)	Opacification becomes complete, and the Lens becomes pearly white	*Kapha* *Vyana (srotoshodhana), Udana (srotopurana), Samana (ambu-avalambana)*
Hyper-mature Senile Cataract (HMSC) – Morgagnian	The whole cortex liquefies, and the lens is converted into a bag of milky fluid.	*Kapha* *Udana (srotopurana), Samana (ambu-avalambana), Pitta (paka)*
Hyper-mature Senile Cataract (HMSC) – Sclerotic	The cortex becomes disintegrated, and the lens shrinks due to water leakage.	*Vyana (srotoshodhana)*

The inner surface of the posterior capsule experiences posterior migration of the lens's epithelial cells from the equator to the visual axis, which is followed by enlargement. The *dosha* analysis for posterior subcapsular cataracts, which can be drug-induced or the outcome of other ocular or systemic disorders, varies depending on the cause and subsequent colour of the lens. However, the one that comes from purely senile alterations can be assigned to *Kapha* (*gourava, sandra*: granular deposits), which again impairs *Samana Vata's* ability to operate (*ambu avalambana*: incorrect management of fluids, leading to swelling).

Additionally, in posterior subcapsular cataracts, the whitish-yellow opacification of the lens correlates with the *pandu varna* of *Kaphaja Kacha.*

DISCUSSION

'*Timira*', the term indicates '*Andhakara*' or blindness, which represents visual impairment at the beginning to complete blindness at the advanced stage of the disease. Therefore, it is considered *paramadaruna. Kacha* (immature senile cataract) and *Linganasha* are the successive stages of the disease *Timira.* Excessive exposure to sunlight, alcohol, smoking and dietary factors are the common etiological factors found in both cataract and *Kacha.* Hydration is one of the factors involved in catarctogenisis, which is seen even in *Timira* (*Timi Kledane Aardri Bhava*).[18] Senile cataract is the largest contributor to global blindness in the people of age group >50 years. Gradual painless loss of vision depending on different stages of maturity and visual disturbances like misty vision, polyopia, black spots in front of the eyes are the common symptoms found in both of these diseases.[19]

Nidana Parivarjana or avoiding the cause is the best method of treatment modalities found in *Ayurvedic* classics which is found even in modern ophthalmology text books which suggest that removal of irradiation (infrared or x-rays) and cataractogenic drugs like steroids etc. may delay cataractogenisis.[20] Besides, the prevalence of cataracts in the pre-senile age group increases yearly. Therefore, universal demand is an alternative to surgery to prevent or reverse the cataractous change. The *samprapti* of *Timira* and its progressive stages are briefly described in available *Ayurveda* texts. Therefore, decoding the pathophysiology given in conventional systems through basic principles of *Ayurveda* is necessary to plan an effective treatment. The nuclear sclerosis type of cataract resembles *Vataja Kacha,* while cortical cataracts and posterior subcapsular cataracts resemble *Kaphaja Kacha,* according to the pathophysiology and symptoms of the various varieties of senile cataracts as previously discussed. Posterior subcapsular cataracts following any ocular or systemic inflammations, drug-induced, irradiation, traumatic cataracts can be correlated to *Pittaja, Parimlayi* or *Sannipataja Kacha* based on their symptoms and colouration of the lens. Even in *Ayurvedic* texts on *Ragi Timira*, the primary treatment is *shastra karma*, or surgery; this is particularly true for the *Kaphaja* version (other varieties are *yapya*-manageable). However, for individuals with *alpa raga* who are unable to undergo surgery, the *Timira (aragi)* path of treatment should be followed. As part of the *Dinacharya* mentioned in *Ayurvedic* classics, various forms of *Ahara*, such as *Purana Ghrita*, *Triphala*, *Shatavari, Patola*, *Mudga*, and

Yava,[21] and preventive regimens, such as *Anjana* (collyrium application), *Nasya* (nasal medication), *Padabhyanga* (oil-massaged feet*), Netra Prakshalana* (eye wash), palming, etc., can be used to prevent *Kacha.*

Vitamin A, C, E, beta carotene, flavonoids and minerals like zinc present in *Chakshushya Ahara* having antioxidant activity, act as free radical scavengers and therefore prevent degeneration of lens fibers.[22] Thus, in the initial phases of senile cataract, despite significant visual impairments, *Ayurvedic* treatment based on the previously mentioned principles might contribute to a favourable visual outcome by reversing the pathogenesis and delaying the maturation and surgical requirement. Using *Chakshusya* and *Rasayana* formulations before the beginning of senile cataract may also prevent it from developing and slow down its maturation, as senile cataracts are caused by age-related changes in the lens.

CONCLUSION

Cataract is the major cause of global blindness and the best way of managing it is by prevention. When we considered the comparative analysis of the symptoms of cataract and *Kacha*, we find that the descriptions provided by *Acharya Sushruta* and *Acharya Vagbhata* are similar to those of various types of cataracts. The part of *Timira, Kacha, Linganasha* can be correlated to cataract. All three *Doshas* are involved in the *Samprapti* of *Kacha*. Regarding the prognosis of *Kacha*, it is considered as *Yapya Vyadhi.*[23]

Avyakta Darshana, Viwhala Darshna, Dwividha Darshana, Tanu Aavritopamam, Drishti Ranjana, these features are strongly in correlation with Cataract. But we conclude that cataract is a part of *Timira, Kacha, Lingnasha*. Modern ophthalmology doesn't have any medical treatment for cataract till date whereas *Ayurveda* has elaborated treatment principle and therapeutic procedures of *Kacha* thousands of years back. Prophylactic measures for *kacha* mentioned in *Ayurvedic* classics along with *Nidana Parivarjana, Dinacharya* and suitable *Kriyakalpas* will prevent age related eye diseases like cataract and will also delay its progression.

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