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Clinical Study on the Effect of Ayurvedic Medicines in the Management of *Kācha* with special reference to Immature Senile Cataract

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ABSTRACT

Shalakya Tantra is one among the *Ashtanga Ayurveda*; which deals with diseases occurring above the clavicle specially the sensory organs. The disorders which cause partial or complete visual disturbances are known as *Drishtigata Roga.* As per Vagbhata, 3rd *Patalagata Timira* is known as *Kācha* which is characterized by gradual loss of vision and *Rāgaprāpta Drishti* (coloured visual/pupillary area). In cataract the crystalline lens becomes coloured due to opacifications and the main feature of immature cataract is gradual diminished vision. Hence 3rd *Patalagata Timira* can be correlated with the Immature Senile Cataract. Cataract is the world's leading cause of blindness affecting an estimated 20 million people. This is expected to increase to 50 million by the year 2020. In this regard current study was carried out with the aim of to evaluate the role of *Navapatala Varti Anjana* along with *Śatāvaryādi Cūrṇa* in the management of *Kācha.* Trial was conducted with 30 patients attending the OPD and IPD of Shalakya Department of NIA, Jaipur as per the exclusion and inclusion criteria. Assessments were done before (BT) and after (AT) completion of treatment and after the follow up (AF) period with SPSS 2016 and Microsoft Excel 2007. All the chief complaints got statistically highly significant results. Statistically highly significant results were found in visual acuity and PSC type of cataract while Nuclear and cortical type of cataract received statistically significant results. Hence immature cataract can be successfully managed by the selected medicines.

KEYWORDS

Kācha, Cataract, Lens opacities, *Anjana Karma*

Greentree Group

INTRODUCTION

Ayurveda is a philosophy of life with holistic approach which deals with science of life or longevity. *Shalakya Tantra* is one among the *Ashtanga Ayurveda*; which deals with diseases occurring above the clavicle specially the sensory organs i.e., Eyes, Nose, Ears and Tongue. Out of all the sense organs eyes are the most precious gift of God to mankind thus it is rightly justified as "*Sarvendriyānām Nayanam Pradhānam*" by Chanakya in Neeti Shatakaya.

Any opacity in lens or its capsule is known as cataract. It is caused due to degeneration and opacification of the lens fibres or deposition of other materials in the lens as a result of altered physiological changes within its substances[1].The senile cataract is a condition where the degenerative changes occur in the lens fibres with the advancement of age[2].The earlier symptoms are disturbance of vision, diminution of vision and finally loss of vision. Cataract is the world's leading cause of blindness affecting an estimated 20 million people. This is expected to increase to 50 million by the year 2020 due to population growth and increased longevity (Bull WHO-2004). Cataract is the most significant cause of bilateral blindness, both in India (50-80%) as well as on a global scale. It has been estimated that prevalence of cataract in India is three times more than that of US. There are 100 million eyes with cataract causing a vision of <6/60 and 3.8 million people worldwide become blind each year due to cataract[3].

The disorders which cause partial or complete visual disturbances are known as *Drishtigata Roga.* In the concept of *Dristi Roga* basically two terms deserves special attention i.e.,*Patala* and *Timira*. According to Susruta *Timira, Kācha* and *Linganāsha* are the three succeeding stages of the same disease[4] which causes visual disturbances without pain. But Vagbhata explained *Timira, Kācha* and *Linganāsha* as different diseases[5]. As per Vagbhata, 3rd *Patalagata Timira* is known as *Kācha* which is characterized by gradual loss of vision and *Rāgaprāpta Drishti* (coloured visual/pupillary area)[6]. In cataract also the crystalline lens becomes coloured due to opacification and the main feature of immature cataract is gradual diminished vision. Hence the 3rd *Patalagata Timira* can be correlated with the Immature Senile Cataract. Susruta did not mention about any colourization of *Drishti* in 3rd *Patalagata Timira.* As per Susruta; when *Doshas* advance into the 4th *Patala* it is known as

Linganāsha/Nilikācha. Dalhana commented that colourised *Timira* occurring in the 3rd *Patala* is known as *Kācha* while *Linganāsha* is distinguished by the term *Nilikācha.*

Although many advances have been made in modern science yet there is no time tested and proven medical treatment to delay, prevent or reverse the degenerative changes in the lens. Also cataract is a common problem among elderly people with high prevalence rate and it hampers daily routine. Hence there is a need to involve any indigenous medicine that simply delays the progression of cataract, which will be a great achievement for developing countries like Sri Lanka, India etc.

However various medical remedies have been advised to manage *Kācha* in different Ayurvedic classical texts. Surgery is mentioned in the final stage of *Linganasha* where there is total loss of vision. In this regard *Navapatala Varti Anjana* and *Śatāvaryādi Cūrṇa* orally are selected for the present study.

AIM

1. To evaluate the role of *Navapatala Varti Anjana* along with *Śatāvaryādi Cūrṇa* in the management of *Kācha* (Immature Senile Cataract).

MATERIALS AND METHODS

This trial was conducted with ethical clearance obtained from the Institutional Ethics Committee of National Institute of Ayurveda, Jaipur, Rajasthan. Ref no is IEC/ACA/2015/86 dated 21/05/2015.Total 30 patients attending the OPD and IPD of Shalakya Department of NIA, Jaipur were screened out for clinical signs and symptoms of immature senile cataract and were selected for the present study as per the exclusion and inclusion criteria.

Inclusion Criteria

1. Patients between the age group of 45-75 years were selected irrespective of sex, religion, occupation, caste, social and economic status.

2. The patients having the signs and symptoms of *Kācha* (signs and symptoms of Immature Senile Cataract).

3. Patients having visual acuity more than 6/9 were selected.

Exclusion criteria

1. Patients having any fundus pathology causing diminution of vision.

2. Patients having Congenial, developmental, traumatic, complicated, metabolic mature and hyper mature cataract.

3. Patients on prolonged systemic medications.

4. Patients having uncontrolled Diabetes Mellitus, Hypertension etc. were excluded.

Drug Administration Procedure

One *Harenu Matra* of *Navapatala Varti Anjana* was applied twice a day mixed with bee honey along with *Śatāvaryādi Chūrṇa* (5g) orally with hot water twice a day for 45 days.(All the above drugs were prepared in the Pharmacy of National Institute of Ayurveda, Jaipur)

Follow up period – After one month from the date of completion of treatment.

Assessment criteria

The assessments were done before and after completion of treatment and after the follow-up period. The clinical trial was assessed for its efficacy on the basis of following subjective and objective criteria;

Assessment criteria for the subjective parameters-

1. Perturbed vision (*Viwhala Darshana*) – Visualization of non existing objects like flies, gnats, hairs, webs, circles, flags, mirage and ear rings.

0 - No perturbed vision

1 - Occasionally present but does not disturb daily routine (Mild)

2 - Frequently present but does not disturb daily routine (Moderate)

3 - Frequently present and disturbs daily routine (Severe)

2. Eye straining (*Netrāyasa*)

0 - No feeling of eye straining

1 – Occurs more than 4 hours of near work (Mild)

2 – Occurs within 2-4 hours of near work (Moderate)

3 – Occurs less than 2 hours of near work (Severe)

3. Watering of eyes

0 - No excessive lacrimation

1 - Occasionally present, need not wipe with handkerchief (mild)

2 - Frequently present, need to wipe with handkerchief but does not disturb daily routine (moderate)

3- Present throughout the day, need to wipe with handkerchief frequently and also disturbing daily routine (severe)

4. Headache (*Shirobhitapa*)

0 - No headache

1 - Occasionally present and not disturbing daily routine (mild)

2 - Frequently present and disturbing daily routine (moderate)

3 - Present throughout the day, very much disturbing daily routine (severe)

5. Binocular diplopia (*Dvividha Darshana*)

0 - No diplopia

1 - Occasionally present but does not disturb daily routine (Mild)

2 - Frequently present but does not disturb daily routine (Moderate)

3 - Frequently present and disturbs daily routine (Severe)

6. Glare

0 - Absent

1 - Night time only but does not disturb daily routine (Mild)

2 - Day time only but does not disturb daily routine (Moderate)

3 - Appears day or night and disturbs daily routine (Severe)

Assessment criteria for the objective parameters-

1. Blurred in distant vision (*Avyakta Darshana*)

0 - No difficulty in distance vision (6/6)

1 - 6/9 to 6/12 (Mild)

2 - 6/18 to 6/24 (Moderate)

3 - More than 6/36 (Severe)

2. Blurred in near vision (*Avyakta Darshana*)

0 - No difficulty in near vision (N5)

1 - N 6 to N 12 (Mild)

2 - N18 to N24 (Moderate)

3 - More than N24 (Severe)

3. Visual acuity with glass (After refraction visual acuity)

0 - 6/6

1 - 6/9

2 - 6/12

3 - 6/18

4 - 6/24

5 - 6/36

4. Iris shadow

0 – Present

1 – Absent

5. Cataract grading

0 - No cataract

1 - Grade I (soft and white, greenish yellow nuclear)

2 - Grade II (soft – medium and yellowish nuclear)

3 - Grade III (medium hard and amber nuclear)

4 - Grade IV (hard and brownish nuclear)

5 - Grade V (ultra hard and blackish nuclear)

(Note – cataract grading has been on the basis of LOCS cataract grading system)

Statistical analysis

Special Package for Social Statistics (SPSS) 2016 and Microsoft Excel 2007 was used for the analysis. The scoring of criteria of assessment was analyzed statistically in terms of mean values of BT (Before Treatment), AT (After Treatment), SD (Standard Deviation) and SE (Standard Error). The following significant levels were considered, Statistically Highly Significant (SHS) – $p<0.001$, Statistically Very Significant (SVS) – $p<0.01$, Statistically

Significant (SS) – p<0.05, Statistically Not Significant (SNS) – p>0.05.

OBSERVATIONS

Maximum numbers of patients (56.67%) were between the age group of 45-55 years, were females and all were married. Majority of patients were from urban area (76.67%) and belonged to Hindu community (66.67%). It was observed that majority 33.33% had education level up to 6th till 10th grade and 30% had education less than 5th grade. On the other hand 23.33% of them were illiterates. Occupation wise maximum number of patients (45%) were house wives and belonged to middle socio-economic status (56.67%). The highlighted pre-disposing factors were exposure to direct sunlight (76.67%), exposure to dust (76.67%) and exposure to heat (56.67%). Majority (86.67%) of patients did not take any treatment before participated to this trial and 68.33% had a family history related to cataract. Majority of patients did not show any systemic diseases. However, 15% and 13.33% of them had history of hypertension and diabetes respectively and all of them were under medications for the same.

Total 120 eyes of 60 patients were considered separately for the study. Among those 120 eyes 96.67% eyes presented as immature cataractous while 1.67% as hypermature or brown cataract and 1.67% as pseodophacik eyes which were not consider for the statistical calculations of the disease. Observed main chief complaints were perturbed vision (33.33%), blurred distant vision (100%), blurred near vision (96.67%) and eye staining (96.67%).Watering eyes (46.67%), glare (30%), diplopia (26.67%) and headache (60%) were the associated complaints and almost all the patients showed gradual onset of the disease. Majority of people (83.33%) suffered from Posterior Sub Capsular (PSC) type of cataract and the second commonest type was Nuclear cataract (56.67%), 56.67% had cortical type of cataract. Also most of the people had more than one type of cataract (mixed type). In this study group following aetiological factors were highlighted i.e., get often worried (73.33%), hot tempered (50%), often headache (48.33%), taking excessive liquids after meals (40%), day time sleeping (36.67%), elevated pillows (36.67%), hot water head bath (35%) and frequent eye straining occupations (36.67%). Among all characteristic features of *Vātaja Kācha,* 96.67% patients complained of dusty or smoky appearance of vision. Majority of 83.33% people did not show any of the features of *Paitika Kācha* and only 13.33%

Table 1 Effect on chief complaints as BT vs. AT

| Symptoms | Mean | | d | % of Change | SD | SE | t | P | Results |
	BT	AT							
1. Perturbed vision	0.38	0.16	0.22	57.89	0.41	0.06	3.57	0.000	SHS
2. Blurred distant vision	2.34	1.05	1.29	55.13	0.53	0.07	18.17	0.000	SHS
3. Blurred near vision	2.46	2.25	0.21	8.54	0.41	0.06	3.87	0.000	SHS
4. Eye straining	2.09	1.64	0.45	21.53	0.6	0.08	5.56	0.000	SHS

Table 2 Effect on chief complaints as AT vs. AF

| Symptoms | Mean | | d | % of Change | SD | SE | t | p | Results |
	AT	AF							
1. Perturbed vision	0.17	0.17	0	0.00					
2. Blurred distant vision	1.21	1.19	0.02	1.65	0.14	0.02	1	0.322	SNS
3. Blurred near vision	2.42	2.38	0.04	1.65	0.19	0.03	1.43	0.159	SNS
4. Eye straining	1.48	0.5	0.98	66.22	0.96	0.13	7.37	0.000	SHS

complained of seeing bright objects like moon, sun, fire etc. and surrounded by coloured rings. It was observed majority of patients 51.67% saw objects as covered by cloth and 26.67% of them complained of appearance of bright objects as lusterless which are the characteristic features of *Kaphaja Kācha*. None of them showed *Raktaja* or *Tridoshaja* type features of *Kācha*. While considering the features of *Patalagata Timira*; almost all the patients had complaint of 1st *Patalagata* feature i.e. *Avyakta Darshana* or seeing objects as hazy. Majority 86.67% of them were not able to pass a thread through the eye of a needle, 85% felt darkness in front of eyes, 56.66% had perturbed vision and 45% complained of visual hallucinations such as flies, mosquitoes, hairs etc. which are the features

of 2nd *Ptalagata Timira*. When considering 3rd *Patalagata Timira* almost all the patients suffered from dimness of vision and 38.33% had complained of seeing objects as covered by a cloth and none of them showed any characteristic feature of 4th *Patalagata Timira*.

RESULTS

In chief complaints as compared to BT Vs AT all the symptoms got statistically highly significant results i.e. Perturbed vision (57.89%), blurred distant vision (55.13%), blurred near vision (8.54%) and eye straining (21.53%) which is shown in table 1. When comparison was done between AT Vs. AF, there was no change in perturbed vision and showed statistically highly significant results in eye straining (66.22%).

Table 3 Effect on other complaints as BT vs. AT

Symptoms	Mean		d	% of Change	SD	SE	t	p	Results
	BT	AT							
1. Watering of eyes	0.61	0	0.61	100.00	0.73	0.1	6.22	0.000	SHS
2. Glare	0.34	0.16	0.18	52.94	0.43	0.06	3.1	0.003	SVS
3. Headache	0.83	0	0.83	100.00	0.83	0.15	5.47	0.000	SHS
4. Binocular diplopia	0.4	0.2	0.2	50.00	0.41	0.07	2.69	0.012	SS

Table 4 Effect on other complaints as AT vs. AF

Symptoms	Mean		d	% of Change	SD	SE	t	p	Results
	AT	AF							
1. Watering eyes	0	0	0	0.00					
2. Glare	0.16	0.16	0	0.00					
3. Headache	0	0	0	0.00					
4. Binocular diplopia	0.2	0.17	0.03	15.00	0.18	0.03	1	0.326	SNS

Also it was found statistically non significant result in blurred distant vision and blurred near vision (Table 2). Compared to BT vs. AT, watering of eyes and headache got statistically highly significant results, glare received statistically very significant results and binocular diplopia had statistically significant results (Table 3) which were the associated complaints. When compared between AT vs. AF (Table No. 4); binocular diplopia had statistically non significant result while all the other signs had constant results. In objective parameters, statistically highly significant results were found as compared to BT Vs AT (Table No. 5) in visual acuity and PSC (Posterior subcapsular cataract) type of cataract while Nuclear and cortical type of cataract received statistically significant results. But there was no statistical change on iris shadow. On comparison of AT Vs. AF results (Table No. 6), showed that statistically non significant results on visual acuity with glass and PSC type of cataract while in nuclear and cortical types of cataract and iris shadow there were no statistical changes. Achieved statistically non significant results in all the spectacle power parameters except presbyopic correction in BT vs. AT. Presbyopic correction achieved statistically significant results (Table No. 7). All the spectacle power parameters did not show any changes during the follow up period while myopic cylindrical power showed statistically non significant result (Table No. 8).

DISCUSSION

Navapatala Varti Anjana[7] contains 23 ingredients including both the mineral and

Table 5 Effect on objective parameters as BT vs. AT

Objective parameters	Mean		d	% of Change	SD	SE	t	P	Results
	BT	AT							
Visual acuity with glass	1.48	0.63	0.85	57.43	1.26	0.17	2.1	0.000	SHS
Iris shadow	1	1	0	0.00					
Cataract Grading									
Nuclear	0.91	0.82	0.09	9.89	0.29	0.04	2.32	0.024	SS
PSC	1.39	0.95	0.44	31.65	0.69	0.09	4.87	0.000	SHS
Cortical	1	0.88	0.12	12.00	0.38	0.05	2.43	0.018	SS

Table 6 Effect on objective parameters as AT vs. AF

Objective parameters	Mean		d	% of Change	SD	SE	t	P	Results
	AT	AF							
Visual acuity with glass	0.63	0.64	-0.01	-1.59	0.13	0.02	-1	0.322	SNS
Iris shadow	1	1	0	0.00					
Cataract Grading									
Nuclear	0.82	0.82	0	0.00					
PSC	0.95	0.93	0.02	2.11	0.13	0.02	1	0.322	SNS
Cortical	0.88	0.88	0	0.00					

herbal drugs such as rock alum, calamine, rock salt, asbestos, *Glycyrrhiza glabra, Cuminum cyminum, Piper longum, Picrorhiza kurroa, Eclipta elba, Vitex negundo* etc. which has 21.7% of *Shotahara* drugs and 56% of *Kaphavāta Shamaka* drugs, 63.6% *Ushana Virya* drugs, 61.9% *Katu Vipaka Dravyas 75%* and 45% of *Katu* and *Tikta Rasa* drugs, respectively and 28.5% of *Ruksha* drugs. Normally lens contains 65% of water but in immature stage it will be increased to about 68-70% and in hypermature morgagian stage about 78-80%[8]. Hence hydration of lens matter is one of the leading cause of cataract. Thus these medicinal properties may reduce the hydration of lens matter and may reverse the cataract formation in initial stages.

Moreover it contains 8.7% of *Lekhana* ingredients which is helpful in clearing opacification of lens fibres and the presence of 39% of *Chakshushya* drugs may positively improve vision.

Table 7 Effect on Spectacle Power in Group as BT vs. AT

Objective parameters	Mean		d	% of Change	SD	SE	t	P	Results
	BT	AT							
Myopic Spherical	-0.67	-0.98	0.31	-46.27	0.78	0.22	1.41	0.183	SNS
Myopic Cylindrical	-0.69	-1.06	0.37	-53.62	0.85	0.23	1.558	0.145	SNS

Hypermetropic Spherical	0.85	0.81	0.04	4.71	0.37	0.06	0.73	0.470	SNS
Hypermetropic Cylindrical	0.26	0.34	-0.08	-30.77	0.36	0.06	-1.58	0.121	SNS
Presbyopic Correction	2.42	2.39	0.03	1.24	0.13	0.02	2.06	0.044	SS

Table 8 Effect on Spectacle Poweras AT vs. AF

| Objective parameters | Mean | | d | % of Change | SD | SE | t | P | Results |
	BT	AT							
Myopic Spherical	-1	-1	0	0.00					
Myopic Cylindrical	-1.15	-1.17	0.02	-1.74	0.07	0.02	1	0.339	SNS
Hypermetropic Spherical	0.78	0.78	0	0.00					
Hypermetropic Cylindrical	0.34	0.34	0	0.00					
Presbyopic Correction	2.39	2.39	0	0.00					

Śatāvaryādi Cūrṇa[9] contains 83% of *Madhura* and 67% of *Tikta Rasa* drugs. Also it contains 67% of *Madhura Vipaka* drugs, 50 % of *Kaphavata Shamaka* and *Tridosha Shamaka* drugs, 33% of *Chakshushya* and *Rasayana* drugs. Meanwhile it is indicated for *Timira, Kācha, Patala* and blurred vision (smoky) in Yogaratnakara[8].

Due to above properties of drugs this study group had statistically highly significant results in all the chief complaints. i.e., perturbed vision, blurred distant vision, blurred near vision and eye straining with the p value of 0.00. Also observed statistically very significant results in binocular diplopia and headache, highly significant in watering of eyes and significant results in glare. The most important statistically highly significant

results were found in visual acuity and PSC type of cataract while Nuclear and cortical type of cataract received statistically significant results. But no statistical change on iris shadow was observed as 100% relief on cataract was not achieved.

CONCLUSION

This study proves that immature senile cataract is more common in elderly female and population that belongs to lower socio economic status with poor education levels and there was a high risk for pre-senile cataract in senile age group of above 50 years. Exposure to direct sunlight, dust and heat, tobacco, smoking and heredity were the identified risk factor for senile cataract. Among the 6 varieties of *Doshaja Timira, Kācha* and *Linganāsha* the signs and

symptoms of *Kaphaja Kācha* can be correlated with immature cataract as *Drishti* appears white in colour and one perceives objects as if covered by a cloth or of hazy appearance. *Navapatala Varti Anjana* may positively affect the hyper hydration of lens matter, reduce the opacification and promote improvement of vision due to its medicinal properties while *Śatāvaryādi Cūrṇa* may be helpful in promoting the clarity of vision. Finally it can be concluded that all the medicines selected were very cost effective and given better efficacy in treatment of immature cataract.

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