“ANALYSIS OF VISUAL FUNCTION AND QUALITY OF LIFE IN PATIENTS WITH UVEITIS”

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CERTIFICATE

This is to certify that this dissertation entitled **"ANALYSIS OF VISUAL FUNCTION AND QUALITY OF LIFE IN PATIENTS WITH UVEITIS"** is a bonafide work done by **Dr.Krishnamoorthy.T** under our guidance and supervision in the Uvea Services of Aravind Eye Hospital and Post Graduate Institute of Ophthalmology,Madurai during the period of his Postgraduate training in Ophthalmology for May 2012 –April 2015.

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DECLARATION

I, **Dr.Krishnamoorthy.T**, hereby declare that this dissertation entitled, **"ANALYSIS OF VISUAL FUNCTION AND QUALITY OF LIFE IN PATIENTS WITH UVEITIS"** is being submitted in partial fulfilment for the award of MS degree in Ophthalmology by The Tamilnadu Dr.MGR Medical University in the examination to be held in April 2015.

I declare that this dissertation is my original work and has not formed the basis for the award of any other degree or diploma award to me previously.

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INTRODUCTION

FUNCTIONAL VISION[1]

The term functional vision explains the effect of vision on quality of life. To recognise face and its expression,reading newspapers,driving a car or bike at night,performing highly skillful tasks,all are related to functional vision to ophthalmic patients.

Acuity, which is typically used to evaluate vision is not as strongly related to many everyday activities as was previously believed. The American Academy of Ophthalmology[1] states that "We know intuitively that given the appriopiate set of circumstances,each of us with 20/20 vision will function as visually handicapped individuals.Thus when a person is driving in to sun at dusk or dawn,change in contrast sensitivity and effect of glare alter detail discrimination."

Studies showed that contrast sensitivity is a strong indicator of visual function[2,3].Contrast sensitivity testing determines the association between optical clarity and the minimum retinal threshold for particular pattern of the object[3,4].Therefore contrast sensitivity strongly denotes functional vision as a whole .Vision is most important of all senses.It is that most of the information from the external world is appreciated through the visual system.

Loss or reduced vision has a strong value on the visual ability and quality of life.Yet,for all vision is importance to each of us,the most common clinical measurement of it is relatively crude and narrow.The process of vision includes many functions such as

Central resolution(Visual Acuity)

Minimal light Sensitivity

Contrast sensitivity

Detection of motion

Colour perception

Colour contrast

Peripheral vision

In the normal clinical setting,we measure only one of the functions-Central resolution of high contrast(Visual acuity).That ,this one simple test does a pretty good job for detecting most visual dysfunction is truly amazing,despite the fact that visual acuity is to all of visual perception,as the elephant trunk is to the whole elephant.

TERMINOLOGY FOR VISUAL FUNCTIONS[5,6]:

The Minium Visible:

Minimum visible acuity is an example of brightness discrimination(to detect small changes in the brightness of two light sources) although it is often misclassified as spatial sense.If the target is a luminous object on a perfectly dark background,this test measures the brightness sensitivity of the eye.The minimum visible is determined not by the visual angle subtended by an object but rather by its brightness relative to the background illumination.

The Minimum Perceptive:

This acuity is concerned with detection of fine objects such as dots or lines against a homogenous background.The object need not be identified or named,merely detected.The minimum perceptive is a measure of brightness discrimination.The threshold associated with minimum perceptible acuity is called the detection threshold.

The Minimum Seperable:

The smallest visual angle at which two separate objects can be discriminated is called minimum seperable.It depends on object contrast and packing density of photoreceptors in the fovea,Two part discrimination ,Landolt C resolution ,the E game and grating acuity are clinical examples of

minimum seperable tasks.The threshold associated with minimum seperable acuity is known as resolution threshold.

Vernier Acuity(Hyper acuity)

The human eye has special ability for spatial localisation .It can detect two parallel lines and straight line in a particular plane.

Minimum Legible:

This acuity is the measure of the spatial sense that is most familiar to clinicians.It tests the patients ability to recognise progressively smaller letters or forms,frequently referred to as optotypes.The angle that the small recognizable letter or symbol subtends on the retina is a measure of visual acuity.The threshold associated with minimum legible acuity is called the recognition threshold.

QUALITY OF LIFE

To explain and identify the patient satisfaction a new concept was introduced i.e., the concept of quality of life.Thus quality of life is a unique parameter[8] which has been assessed to find out the acceptance and effectiveness of our services among the population by recording patients judgement(eg.Sickness impact profile)[9] or provider based assessment i.e., clinician's assessment of patient's functional state(Functional Independence Measure)[10] or proxy based assessment,ascertains the judgement of the family or of other lay people(Functional activities Questionnaire) [11]

The Quality Of Life is a strictly a personalised issue.Thus there is a strong association between the health related quality of life measurement and patient defined issues[7]

[19]WHO defined "Quality of Life" as "a composite measure of physical,mental and social wellbeing as perceived by each individual or by group of individuals –that is to say ,happiness,satisfaction and gratification as it is experienced in such life concerns are health,marriage,family work,financial situation,educational oppurtunities,self esteem,creativity,and trust in others"

Nowadays,People needs a good quality of life.So,Health care providers are concentrating on increasing quality of life by providing hospitality and adequate treatment to the disease or medical or surgical conditions.

In Ophthalmology, the Quality of life and visual functions has been assessed with visual function assessment questionnaires for many diseases like Cataract,Age related macular degeneration,Glaucoma,Low vision patients[14,15,16,17] etc.,.But still lot of work is yet to be done .And hence it was decided to analyse “the quality of life in Uveitic Patients” and to verify the effect of treatment in the same population and to correlate with the contrast sensitivity in day and night vision with and without glare.

UVEITIS

Uveitis,an inflammatory disease of the uveal tract(iris, ciliarybody, choroid) of the eye. Uveitis are vision threatening condition which are relatively under appreciated by the general practioniares and comprehensive ophthalmologists.Few people realise,Uveitis are responsible for leading cause of blindness in developed countries and one of the cause of preventable blindness in developing countries like India.The maximum incidence occurs in 25-50 years age group(working age),the visual impairment in this age group causes economic consequences.

Uveitis is classified on the basis of

1.Anatomy

2.Clinical features

3.Aetiology

Anatomical Classification[21]:

A.Anterior Uveitis

Defined as " inflammation of iris and anterior part of ciliary body"

1.Iritis

2.Iridocyclitis

3.Anterior cyclitis

Based on the type of inflammation ,"Anterior Uveitis can be further classified as"

1.Non-Granulamatous Uveitis

2.Granulamatous Uveitis

B.Intermediate Uveitis

Defined as " inflammation of posterior part of ciliary body (Pars Plana),the extreme periphery of the retina and the underlying Choroid".

C.Posterior Uveitis

Defined as " inflammation of retina posterior to the vitreous base and choroid"

It is classified morphologically as [21]

1.Focal

2.Multifocal

3.Geographical

D.Panuveitis

" It invoves inflammation of the entire Uveal tract"

Clinical Classification[21]:

A.Acute Uveitis:

Termed as" It is of sudden onset and persists for 3 months".If it recurs following inital attack,it is called Recurrent acute

B.Chronic Uveitis:

Termed as "It lasts longer than 3 months. It is of insidious onset.It may be asymptomatic, although acute or subacute exacerbations may occur."

Aetiological Classification[21]:

In this " uveitis is caused by external injury to uvea or invasion by microorganisms or from other agents with in the patients called Exogenous uveitis."Types are

1.Infection with bacteria,Fungi,Viruses

2.Infestation with protozoa,Nematodes

3.Associated with a systemic disease

4.Idiopathic Specific uveitis

5.Idiopathic Non-specific Uveitis

"SUN Working Group" :Description of Uveitis[21,23]

Onset may be sudden or insidious

Duration:limited-if it is of less than 3 months duration

Persistent- if it is of more than three months duration

Course: In Acute condition there will be a sudden onset and limited duration

In Recurrent condition there will be a recurrent episodes with an interval of inactivity in absence of treatment for three months.

In Chronic condition there will be a Persistent uveitis and relapse in less than 3months after discontinuation of treatment

In Remission there will be an inactive disease for atleast three months after discontinuation of treatment

"International Uveitis Study group" recommendation for "Anatomical classification of Uveitis"[24]

Anterior Uveitis	Intermeiate Uveitis(formerly known as Pars Planitis)	Posterior Uveitis	Pan Uveitis
Iritis Iridocyclitis Anterior cyclitis	Posterior cyclitis Hyalitis Basal Retinochoroiditis	Focal Multifocal Diffuse Choroiditis Chorioretinitis Retinochoroiditis	Focal Multifocal Diffuse Choroiditis Chorioretinitis Retinochoroiditis

"SUN Working group" :Activity of Uveitis terminology[21,23]

1.Inactive-Grade 0 cells in Anterior chamber

2.Worsening Activity-if it is of two step incremental in inflammation

3.Improving Activity-if it is of two step decremental in inflammation

4.Remission- disease that is inactive for morethan three months once all treatment is discontinued.

Clinical workup:

It starts with proper history taking which includes complete ocular and systemic history

Symptoms of uveitis include

Rednes,Pain,Photophobia,Watering,Visual disturbances,Floaters

Signs of uveitis include

Circumcorneal congestion, Keratic precipitates, inflammatory cells, flare, hypopyon, iris nodules, synechiae-Anterior and posterior, band keratopathy, inflammatory cells and bands in vitreous, snow banking, retinal edema, cystoid macular edema, epiretinal membranes, infiltrates, neovascularisations etc.,

SUN Classification for grading of Anterior Chamber cells[21,23]

Cells in field	Grade
<1	0
1-5	0.5+
6-15	1+
16-25	2+
26-50	3+
>50	4+

SUN classification for grading of Aqueous Flare[21,23]

Description	Grade
Nil	0
Just detectable	1+
Moderate	2+
Marked	3+
Intense	4+

Laboratory Investigations[25,26,27,28]

It includes General and Specific investigations.

1.General Investigations:

Complete blood count

Chest X-ray

Erythrocyte Sedimentation Rate

FTA-ABS,TPHA,VDRL for Syphilis

Mantoux test for Tuberculosis

Other investigations to rule out systemic illness like diabetes

2.Specific Investigations:

ACE(Angiotensin converting Enzyme) for Sarcoidosis

ANA (Anti Nuclear Antibody)-Autoimmune disorders

ANCA(Anti Neutrophill Cytoplasmic Antibody)-Wegner's Granulomatosis

Choroidal biopsy

Conjunctival biopsy-Sarcoidosis

CT scan of Orbits and B-Scan –Posterior scleritis

CT Scan chest-Sarcoidosis

Enucleated eyeball for Histopathology-Sympathetic Ophthalmia

ELISA-leptospirosis,Toxoplasmosis,Toxocariasis

FFA and ICG

Western blot for HIV

MAT(Micro Agglutination Test)-Leptospirosis

MRI Brain-Lymphoma and Neurosarcoidosis

OCT

PCR

Rheumatoid factor

UBM for angle structures study

Vitreous biopsy

Laser flare meter

Principles of treatment[27,30,31,32]

The main aim of the treatment is to prevent the complications,to relieve patient's discomfort and to treat the underlying cause.

The drugs commonly used for the treatment of uveitis include topical/systemic/periocular steroids in addition with mydriatrics and cycloplegics

Prednisolone Acetate 1% ophthalmic suspension is the most commonly used topical steroid for uveitis.The drug should be dosed according to disease activity.

Triamcinolne Acetonide is the drug mostly preferred for posterior sub-tenon injection.It may also used for intermediate, posterior and panuveitis.

Systemic steroids are the main stay of drug in the treatment of uveitis.Usually started as 1mg/kg/day for a month or till the disease is under control.

Immunosuppressives like Alkylating agents,T-cell inhibitors,anti-metabolites are used when there is no response to steroids or when side effects of steroids are not tolerated.Methotrexate and Cyclosporine are most commonly used as immunosuppressive agents.

Newer biological are the class of drugs used to treat autoimmune disease.Etarnacept,Anakinra,Adalimumab,Infliximab are the examples of newer biological used in the treatment of autoimmune disease.

All systemic therapy should be given under guidance with Physician and Rheumatolgist.Side effects of the drug should be keep in mind while prescribing systemic drugs.

Apart from medical treatment,surgical treatment may also be required in special situations.

The indications include Phaco-antigenic uveitis,Complicated cataract,glaucoma filtering surgery for uncontrolled elevated Intraocular pressure inspite of maximum tolerable medical therapy,vitrectomy,ILM peeling,Retinal detachment surgeries etc.,

In uveitis,it is mandatory to wait for atleast 3 months after the last episode of an active disease to undergo an elective surgery for visual rehabilitation.Complications of cataract surgery in uveitis include Posterior capsular rent,Cystoid Macular Edema,Secondary Glaucoma,persistent inflammation and early posterior capsular opacification.

PHYSIOLGY OF VISION[33,34]

It is a multiple phenomenon.The mechanisms are less understood. The mechanisms concerned with vision are:

- Initiation of vision (Transduction),
- Transmission of visual sensation, and
- Visual perceptions

Initiation and transmission of visual sensations

The photoreceptors like rods and cones are the receiving nerve endings for a visual stimuli. Stimuli for visual sensations may be divided, in a purely physical sense, into two types inadequate and adequate.

Inadequate stimuli produce glowing sensations called phosphenes. Mechanical stimulation by pressure. on the sclera is an example of inadequate stimulus which produces pressure phosphene (which appears as a patch with contrasting border). Other examples of inadequate stimuli are rapid eye movements in dark (producing movement phosphene), passage of weak electric current through retina (producing electrical Phosphene) and passage of X-rays or other ionizing radiations through the retina (producing radiation phosphenes),

Adequate stimuli to vision are formed by visible portion of the electromagnetic radiation spectrum, i.e.,'the light'. It is the spectrum of wavelength lies between 400 nm to 750nm.It is the white light lies between violet end and Red end of visible spectrum.It is the concentric waveforms that produce light ray,these parallel rays of light is needed to produce beam of light.

Light falling upon the retina is absorbed by the photosensitive pigments present in the rods and cones, and initiates photochemical change in the retina.These changes tigger a sequence of events (electrical changes) that initiate the visual sensations. The retinal receptors are not just transducers of light into chemical and electrical signals. they are active processors of information. Thus the electrical potential changes produced and actively processed in the retina are transmitted through the ganglion cells and along the fibers of the optic nerve and other parts of the visual pathway to the visual cortex.

Visual perceptions

Visual perceptions are the functional elements of the vision –it is perceived when the light rays stimulate the retina. These are of four types named as " the light sense, the form sense, the contrast sense and the colour sense."

The light sense

The Light sense refers to the appreciations (awareness) of light and its intensity. The brightness required to induce a light sensation is called light minimum.It is measured after 20-30 minutes after dark adaptation. Dark adaptations is the ability of the eye to adapt itself to decreasing illumination. The rods are much more sensitive to low illumination.The rods are the most sensing receptor for low illumination than cones. This form the basis of the Duplicity. Vision theory states that "rods are used more in dim light (scotopic vision) and cones in bright light (Photopic vision)"..

The form sense

It is the ability of eye to differentiate the size and shapes of the objects.Cone is the sensitive receptor to perceive this difference.Snellen's chart to measure visual acuity is an example for measuring form sense.

Sense of contrast

It is the ability of the eye to differentiate slight change in luminance between th objectsin which there is no well defined border between the objects.

The colour sense

It is the ability of the eye to differentiate colours of different wavelength which are excited by light.Cones perform this function by different types of pigments which absorb red, green and blue wavelengths or light (primary colours).

Other phenomena associated with physiology of vision are included in the following sections:

- **Critical flicker fusion frequencies**
- **Entoptic and allied phenomena**

There are three system pathways associated with colur sense.These three systems process the information as parallel systems. Each of these systems processes the information from all the three systems is then integrated into a single visual perception.

VISUAL ACUITY[33,34]

Visual acuity is a measure of form sense, so it refers to the spatial limit of visual discrimination. In terms of visual angle, the visual acuity is defined as " the reciprocal of the minimum resolvable visual angle measured in minutes of arc of a standard test pattern". It is necessary to understand about visual angle.

Visual Angle

It is the angle measured at the nodal point of the eye in the object space of visual field.

Components of visual acuity

Visual acuity consists of the following components:

- Minimium visible
- Resolution
- Recognition
- Minimum discriminable.

Minimum Visible

The ability of eye to identify object in visual field is called visibility or detection. This kind of task is referred to as the minimum visible or minimum detectable function. The limit of visibility reflects the absolute threshold of

vision. The minimum visible spatial threshold level will depend upon the specification of stimulus such as size, shape, illumination. A few observations made about the minimal visible threshold are as follows:

- A black dot against a white background can be detected, if its diameter is of the order of 30 seconds of arc or more.
- A black square can be discriminated against a light background when the length of a diagonal is 30 seconds.
- An extended line (e.g. visualization of a thin telegraph wire against a uniform sky) with a thickness of as little as one-half second of arc may be discriminable. The ability to discriminate such a fine line when its image is of sufficient extent implies dependence upon some kind of process that involves the convergence of subthreshold signals from a number of individual retinal elements along the extent of retinal image at a common point. The addition of these subthreshold signals yields a discriminable suprathreshold level of activity.
- Detection of an illuminated object against a dark background solely depends upon its intensity and not on its size.

Resolution

The ability of eye to differentiate two spatially separated objects is called minimum resolvable.The measurement of threshold of differentiation is visual acuity.

- If the minimum separation between two light bars is considered, the threshold value becomes increasingly smaller as the width of the bars increases, reaching a limiting condition of approximately one-half second of arc when the light bars have become so broad that the overall presentation is indiscriminable from a dark line against a large homogenous light background.
- The minimum separation, which can be discriminated between two dark bars, will become infinite, as the bars become wider and the stimulus is seen as light line against a dark background.
- The tests to measure visual acuity is form sense.Resolution is the ability to identify the spatial characteristics of a test figure. The test targets in these tests may either consider of letters (Snellen's chart) or broken circles (Landolt's ring). More complex targets include gratings and checkerboard patterns.

Recognition

Ability of the individual to identify the pattern of the objects or images.Example of recognition is the identification of person.

Minimum discriminable or hyperacuity

It is the ability of person to identify objects at lower threshold. The example is Vernier acuity.e.,the ability of person to identify two parallel or straight lines in a particular plane.The threshold values of vernier acuity are

in the range of only few seconds (2-10) of arc. Hyperacuity should not be confused with the threshold for the minimum visible, where merely the presence or absence of a target is being judged. The mechanism subserving hyperacuity is not clearly known, but so much is clear; no contradiction is involved with the optical and recptor mosaic factors that limit ordinary visual acuity.

FACTOR AFFECTING VISUAL ACUITY[33,34]

As discussed earlier, resolution part of the spatial discrimination is considered synonymous with the ordinary visual acuity. And we know that where an observer exhibits the so-called normal visual acuity, all the elements (optical, anatomical and physiological) concerned with the vision are near their peak performance. In general, the factors that influence the spatial resolution can be classified into physical and physiological.

- **Physical factors** include those which influence the light characteristics of the distribution and hence influence the nature of retinal image.
- **Physiological factors** are those which influence the processing of the stimulus and are thus mainly observer related. However, there is some overlap between physical and physiological groups. For example, the lens is a physical factor but the related accommodation process is physiological. Similarly, the size of pupil that controls the amount of light entering the eye is a physical factor but the reflexes controlling its

size are physiological process.

Therefore, these factors have been classified into stimulus-related and the observer-related factors. Further, the list of such factors is exhaustive, but only the important ones are mentioned here briefly.

Stimulus-related factors

1. Luminance of test object
2. Geometrical configuration of the stimulus
3. Contrast of the stimulus from the surround
4. Influence of wavelength of stimulus light
5. Exposure duration of stimulus
6. Interaction effects of the two targets

Observer-related factors

1. Retinal locus of stimulation
2. Pupil size
3. Accommodation
4. Effect of eye movements
5. Meridional variation in acuity
6. Optical elements of the eye
7. Developmental aspects

MEASURMENT OF VISUAL ACUITY[33,34]

Visual acuity consists of

1.Minimum visible

2.Minimum seperable

3.Minimum resolvable

In clinical practice, the measurement of visual acuity is considered synonymous with the measurement of minimum resolvable. The minimum resolvable falls with in the threshold of 30 seconds and 1 minute of arc. Therefore, all the clinical tests employed to measure the visual acuity are designed taking into consideration the threshold of the one minimum resolvable. Based on this basic principle, many visual acuity charts have been developed.

Examination with eye charts is quite satisfactory, but this is obviously incomplete. It emphasizes on foveal vision, usually at one level of illumination, and adaptation at one distance. In order to be complete, it must be supplemented by other tests for near vision at lower luminances,contrast sensitivity and as well as with some test of peripheral function.

It is important to realize that although assessing visual acuity in children may be difficult and often demands painstaking patience; its interpretation should be done in the light of the overall clinical picture. As no

single test is dependable, one must try and use a battery of tests which may be repeated on subsequent follow-ups.

The various visual acuity tests available can be grouped as follow:

I. Detection acuity test.

These assess the ability to detect the smallest stimulus without recognizing correctly. Common detection acuity tests are:

1. Dot visual acuity test
2. Catford drum test
3. Boek candy beads test
4. STYCAR graded Ball's test
5. Schwarting metronome test

II. Recognition acuity tests.

These are designed to assess the ability to recognize the stimulus or to distinguish it from other competing stimuli. These include:

(A) Direction identification tests

1. Snellen's E-Chart test
2. Landolt's C-chat test
3. Sjogren's hand test
4. Arrows test

(B) Letter-identification tests

1. Snellen's letter chart test
2. Sheridan's letter test
3. Flook's symbol test
4. Lipman's HOTV test

(C) Picture identification charts (miniature toy test)

1. Allen's picture cards test
2. Beale Collin's picture charts test
3. Domino cards test
4. Lighthouse test
5. Minature toy test of Sheridan

(D) Test based on picture identification on behavioural pattern

1. Cardiff acuity cards test
2. Bailey Hall cereal test

III. Resolution acuity tests

1. Optokinetic nystagmus (OKN) test
2. Preferential looking test (PLT)
    I. Two-alternative forced choice(2-AFC) test
    II. Operant variation looking(OPL) test

III. Teller acuity cards(TAC) test

3. Visually evoked response (VER)

MEASUREMENT OF VISUAL ACUITY IN SCHOOL CHILDREN (ABOVE 5 YEARS) AND ADULTS[33,34]

Snellen's test

It consists of black capital letters on white background arranged in series of descending size in lines.the lines of each letter measure an angle of one minute of arc in visual field. These lines fit into a square each measured at an angle of five minutes of arc.

Landolt's test

It is similar to Snellen's test types except that in it instead of the letter the broken circles are used. Each broken ring measures an angle of 5 minutes of arc and is constructed similar to letter of Snellen's est types

With Snellen's letters, the end point consists of letter recognition; with Landolts's rings, it consists of the detection of the orientation of the break in the circle. Each method has advantages and disadvantages. Letter targets represent a practical visual test. However, the ability to recognize the target is influenced by literacy and past experience, even if the targets are somewhat blurred. Landolt's rings were designed to eliminate these factors and present a more objective test. However, since the gap can be placed in only four

positions (up, down, left and right) guessing becomes an important factor. Also letter test remain much less confusing for the patient and the examiner, since the identification of letters is both immediate and unequivocal.

Procedure of testing

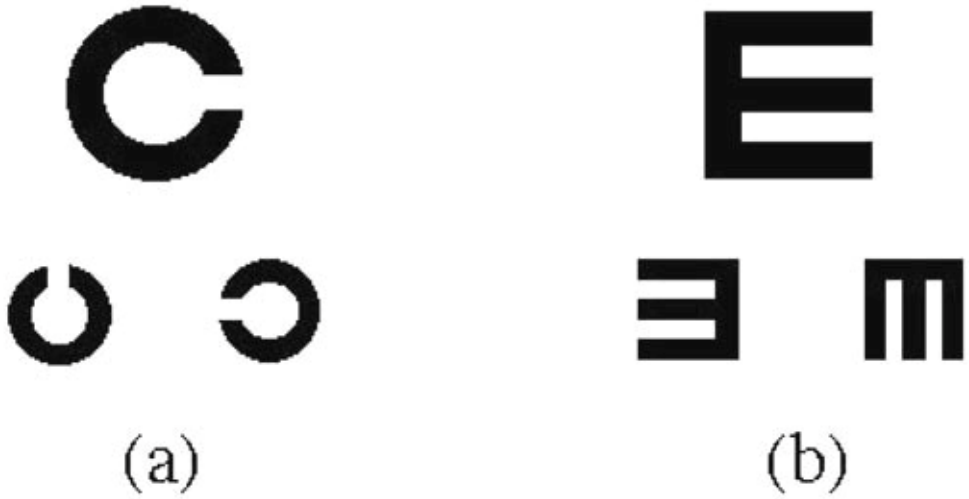
It is usually measured at a distance of 6 metres.so,that light rays falls parallel to eye and there will be less accommodation.The visual acuity is tested in each eyes and the values are recorded.it is recorded as 6/6,6/9,6/12,6/18,6/24,6/36,6/60.If the subject is not able to read top line then it is recorded at 5m,4m,3m,2m,1m.If the subject is unable to red from 1m,then he or she is asked to count fingers of examiner.if not,then he or she is tested for hand movements.if not,finally we can check for perception of light and projection of rays.

Visual acuity equivalents in different notations[33,34]						
MAR or minimum angle of resolution (minutes of arc)	Snellen's Visual acuity (ft) & (m)		Snell-Sterling's Visual efficiency (%)	Loss of central vision (%)	Snellen's fraction acuity relative	Log acuity relative to 20/20
0.5	20/10	6/3	109	0	2.0	0.3
0.75	20/15	6/4.5	104	0	1.33	0.1
1.00	20/20	6/6	100	0	1.0	0
1.25	20/25	6/7.5	96	4	0.8	-0.1
1.5	20/30	6/9	91	9	0.67	-0.18
2.0	20/40	6/12	84	16	0.5	-0.3
2.5	20/50	6/15	76	24	0.4	-0.4
3.0	20/60	6/18	70	30	0.33	-0.5
4.0	20/80	6/24	58	40	0.25	-0.6
5.0	20/100	6/30	49	50	0.2	-0.7
6.0	20/120	6/36	41	60	0.17	-0.78
7.5	20/150	6/45	31	70	0.133	-0.88
10.0	20/200	6/60	20	80	0.1.	-1
20.0	20/400	6/120	3	90	0.05	-1.3

Type of Acuity Tasks:

The detections of target requires perception of stimulus.The stimulus may be different.Some examples are

a)bright object on dark background b)Dark object on bright background



a)Landolt C b)Illiterate E

F

H L

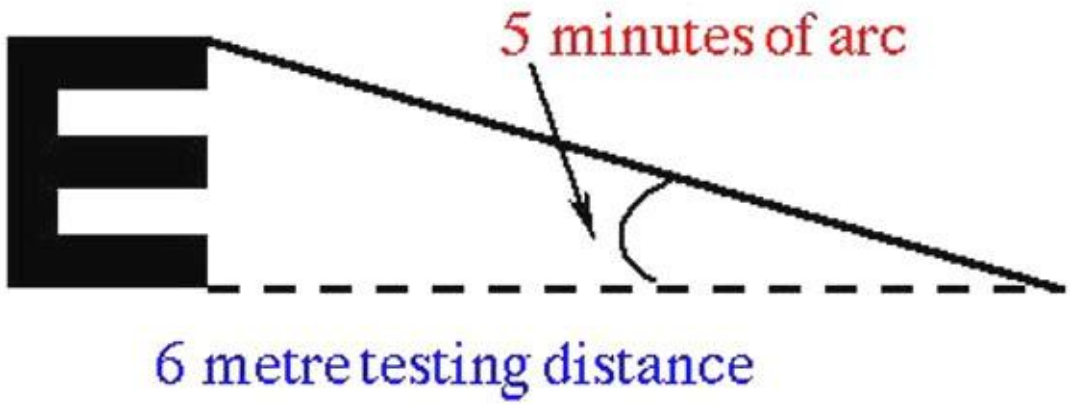
Task recognition by naming the letters in Snellen's chart

Snellen's Notatation is given by

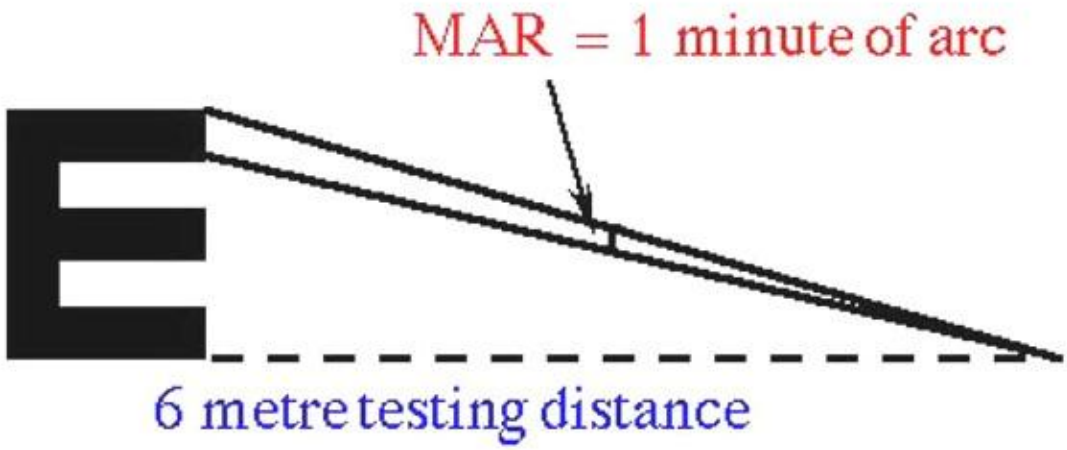
VA=D/d

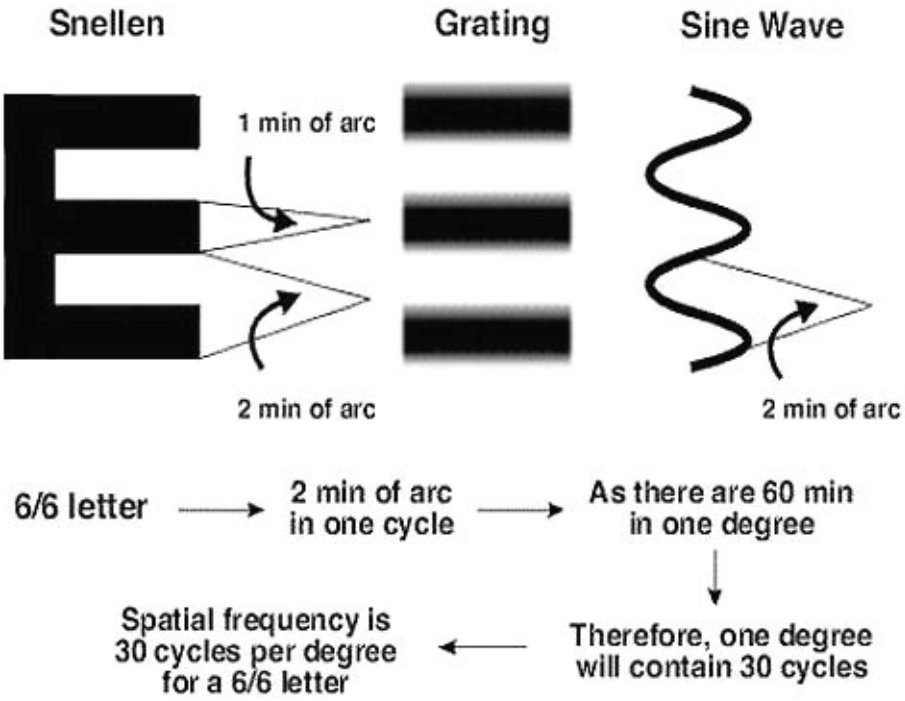
VA-Visual acuity:D-Distance at which letters are read by the subject;d-Distance at which normal person is able to see.

Each snellen letter is subtended at an angle of 5 minutes of arc at a distance of 6 metres

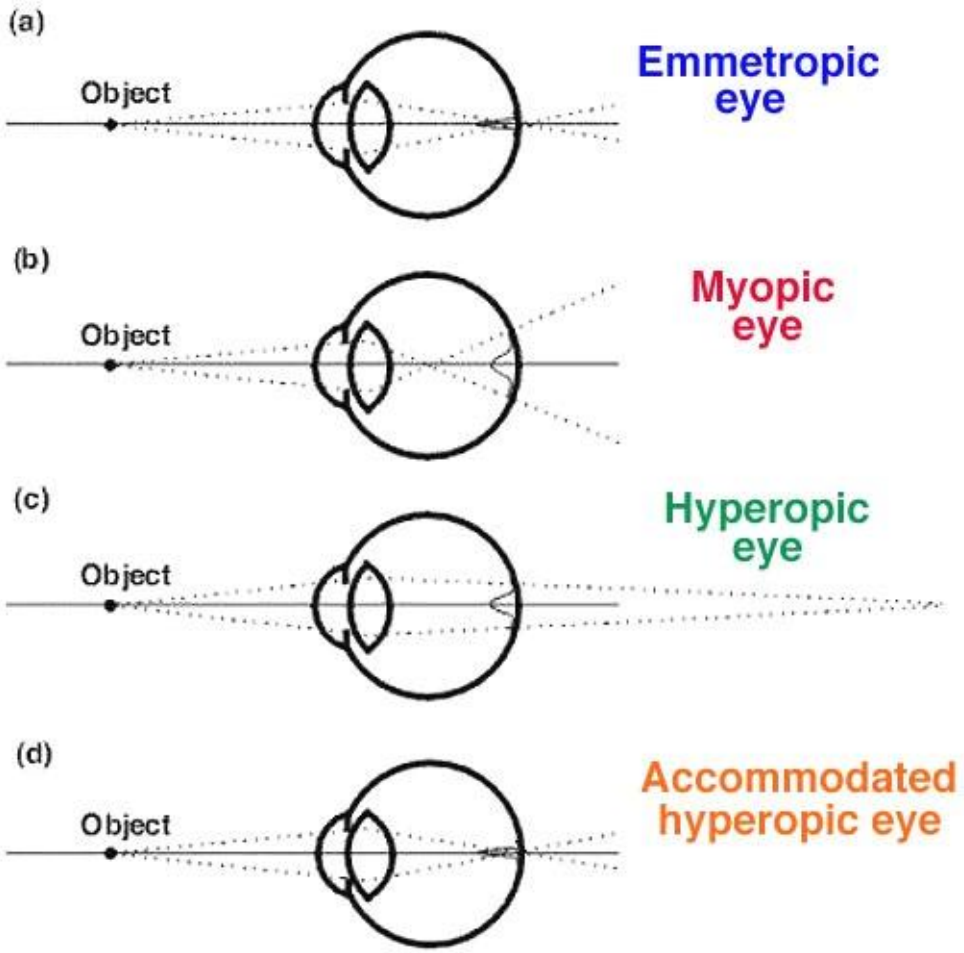


“Each stroke of Snellen letter subtends at an angle of one minute of arc.The reciprocal of snellen’s equation canbe given in angles as minutes of arc i.e., Minimum Angle of Resolution(MAR)” as stated by Adler’s .the log10 of MAR is LogMAR





Snellen’s notation and conversion to spatial frequency



Point spread function in different refractive stages of Eye

MEAUREMENT OF VISUAL ACUITY IN PRESCHOOL CHILDREN

1. Illiterate E-cutout test
2. Tumbling E-pad test
3. Isolated hand-figure test
4. Sheridan Gardiner HOTV test
5. Pictorial vision charts
6. Broken wheel test

7. Boek candy bead test
8. Light home picture cards

VISION TESTS IN 2-3 YEARS

1. Dot visual acuity test
2. Coin test
3. Miniature toy test

VISION TESTS IN 1-2 YEARS

1. Marble game test
2. Sheridan's Ball test

MEASUREMENT OF VISUAL ACUITY IN INFANTS[33,34]

1. Optokinetic nystagmus (OKN) test
2. Preferential looking test (PLT)
3. Visual evoked response (VER)
4. Catford drum test
5. Cardiff acuity cards test
6. Indirect assessment of visual acuity

I. **Blink reflex** in response to sound is present since birth

II. **Menace reflex**, i.e. reflex closure of the eyes on the approach of an object is usually present after the age of 5 months, if vision is normal.

III. Test based on **fixation reflex** are useful in making a rough estimate of vision in infants.

These include:

- Fixation behavior test
- Binocular fixation pattern
- Central, Steady and maintained (CSM) method of rating monocular fixation

MEASUREMENT OF VISUAL ACUITY FOR NEAR[33,34]

Near vision is measured with the help of various types of Near Vision charts.It consists of different size of letters arranged in decreasing order

Near vision charts are

1. **Jaeger's Chart**

   Jaeger, in 1867, devised the near vision chart that consisted of the ordinary printer's fonts of varying sizes used at that time. Printer's fonts have changed considerably since then; however. It is now a general custom to use various sizes of modern fonts that

approximate Jaeger's original choice.It is recorded as J1,J2,J3,J4,J5,J6,J7

2. **Roman test types**.

To create a standard near vision chart,roman type was created by using Times new roman fonts instead of modern fonts.

3. **Snellen's near vision test types**.

It uses same principles as in distant types. It is adjusted to about $1/17^{th}$ of the distant chart letters.

The unusual configuration of letters of this chart, however, cannot be constructed from the available printer's fonts. It can only be reproduced by a photographic reduction of the standard Snellen's distant-vision test types to approximately $1/17^{th}$ of their normal size. Further, such a test has never become popular. The graded sizes of pleasing types of passages from literature, the reading of which helps in the interpretation, are habitually employed.

Procedure of testing

It is tested at a distance of 25-35 cms, under better illumination thrown over his or her left shoulder. Each eye should be tested separately. The near vision is recorded as the smallest type that can be read comfortably by the

patient. A note of the approximate distance at which the near-vision chart is held should also be made

CONTRAST SENSITIVITY[33,34,37,40,41,42]

INTRODUCTION

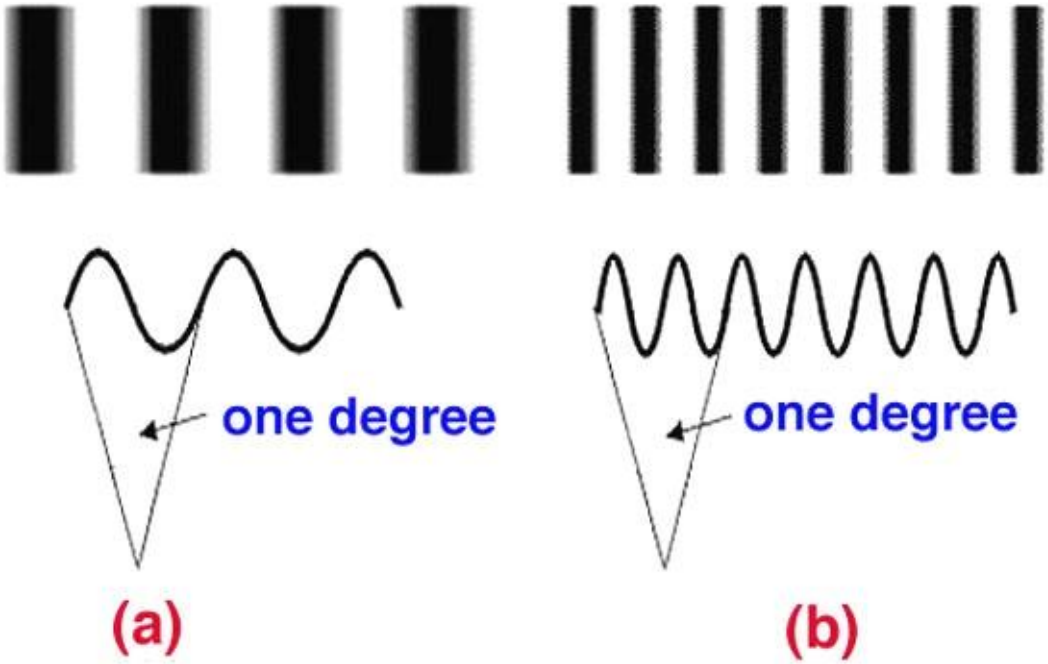
It is defined as the ability of eye to differentiate variance in luminance level which are not separated by well defined borders and to appreciate sharp outlines of small objects.Previously it is measured with snellen's test(high contrast).In many ocular disese,reduced contrast sensitivity is more important and disturbing than loss of visual acuity.It is less even if the subject has 6/6 vision in both eyes.Contrast sensitivity relatively measures the function of retina.

TYPES OF CONTRAST SENSITIVITY

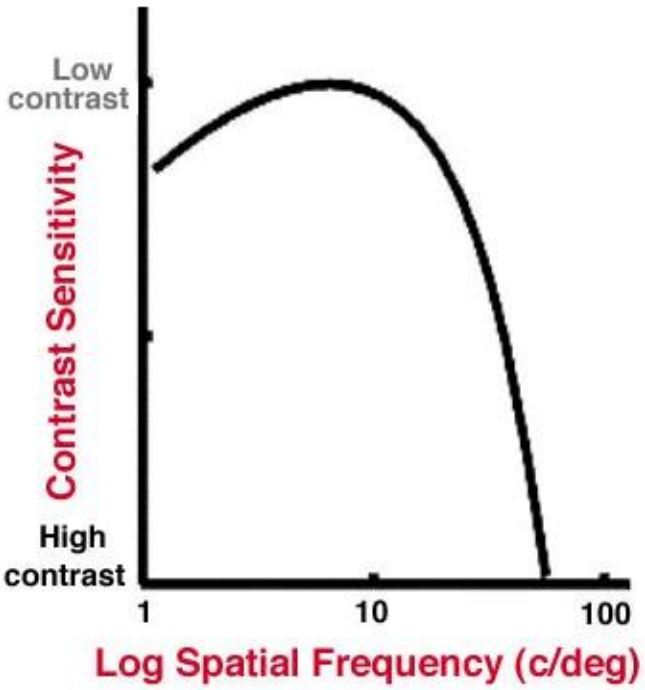
1. Spatial contrast sensitivity

Spatial contrast sensitivity refers to detection of striped patterns at various levels luminance and frequencies. In its measurement, patient is presented with sine wave gratings of parallel light and dark bands (Arden gratings) and is asked to tell the minimum contrast at which the a bars can be seen at seen at each frequency. The width of the bars is defined as spatial

frequency which expresses the number of pairs of dark and light bars subtending an angle of 1 at the eye. A high spatial frequency implied narrow bars, whereas a low spatial frequency indicate wide bars.



Spatial frequency measured in number of cycles per degree a)one cycle per degree b)two cycles per degree

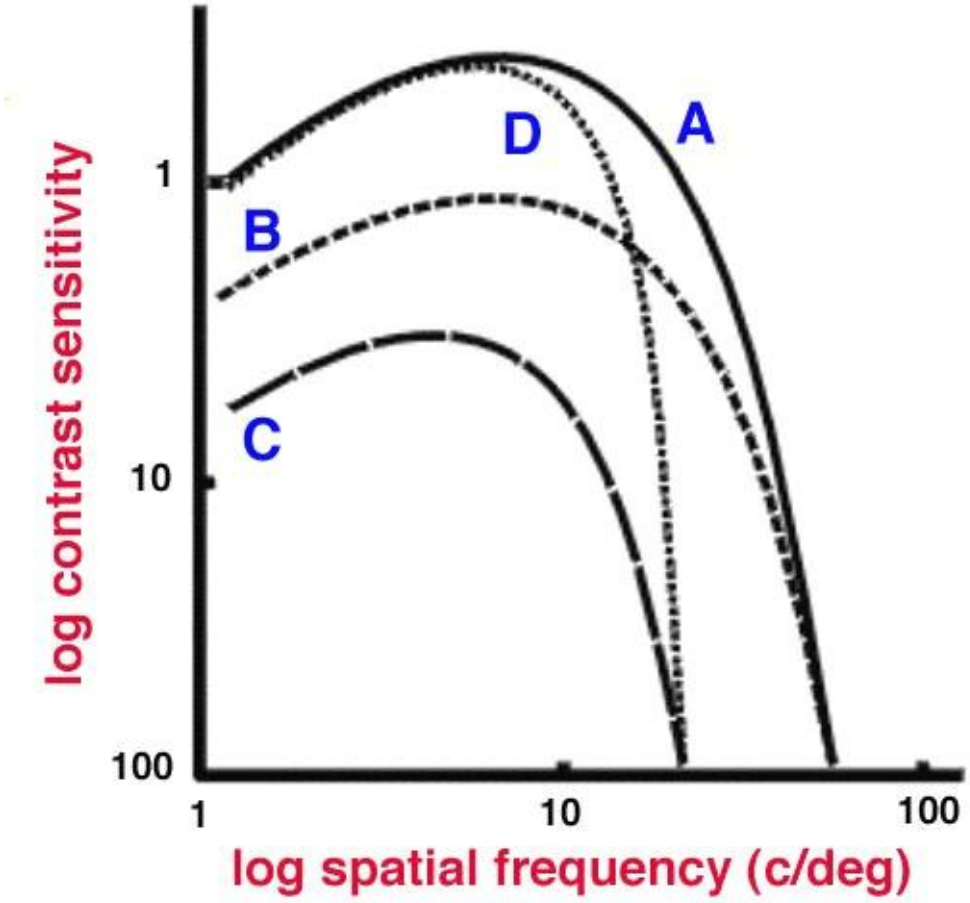


Photopic Contrast sensitivity function

2. Temporal contrast sensitivity

Here the contrast sensitivity function is generated for time-related (temporal) processing in the visual system by presenting a uniform target field modulated sinusoidal in time, rather than as a function of spatial position.

Both temporal and spatial contrast sensitivity testing yield significantly more complete and systematic data on the status of visual performance thanthe conventional test.



Contrast sensitivity in different ocular conditionsA-NormalB-Multiple sclerosis,C-Cataract,D-Amblyopia

MEASUREMENT OFCONTRAST SENSITIVITY[33,34]

When a subject is presented with the grating frequencies and contrast below which resolution is impossible, it indicates the threshold level; and the reciprocal of this threshold level is the contrast sensitivity.

Contrast sensitivity is calculated as **" $(L_{max} - L_{min})/(L_{max} + L_{min})$",** where L is the luminance

VARIABLES IN THE MEASUREMENT

There are three variables in the measurement of contrast sensitivity:

I. Average amount of light reflected depends on illumination of paper and darkness of ink.
II. Degree of blackness in relation to the white background, i.e. contrast.
III. Various levels of cycles per degree of visual angle.

METHODS OF MEASUREMENT

Various methods have been developed to measure contrast sensitivity. Bodis Wollner, introducing contrast sensitivity measurement in clinical practice, suggested the name visuogram, analogue to an audiogram, to describe a patient's contrast sensitivity curve'. The deficits were expressed in terms of decibles, and three types of deficits were described:

1. **High-frequency type** characterized by increasing loss at high frequency.
2. A **level-loss type** characterized by a similar loss for all spatial frequencies.
3. A **selective-loss type** characterized by deficits of spatial frequencies in a narrow band.

In general, the methods recommended to measure contrast sensitivity include: simple plates, cathode ray tube display on a screen, letter acuity charts, laser interferometer (LI) which produces grating on the retina, visual field testing using low contrast rings on stimuli, pattern discrimination test, prototype for forced choice printed test, visually evoked cortical potentials to checkerboard pattern reversal dependent contrast threshold measurement, two-alternative forced choice test and many more.

Some of the simple, inexpensive but reliable methods of measuring contrast sensitivity are described in brief in the following text.

1. Arden gratings test[41]

Arden, in 1978. Introduced a booklet containing seven plates: one screening plate (No.1) and six diagnostic plates (No. 2-7). The contrast changes at the rate of 1.76 log units. The plates are studied at 57 cm, with spatial frequency increasing from 0.2 cycles/degree to 6.4 cycles/degree to 6.4 cycles/degree, each being double the frequency of the previous one. A score of 1-20 is assigned to each plate, depending upon the amount of plate uncovered. Sum of six plates will give a score of 82.It is highly normal for normal individuals.

2. Cambridge low-contrast grating test[33,34]

Cambridge low-contrast gratings consist of a set of ten plates containing gratings in a spiralbound booklet. To perform the test the booklet

is hung on a wall at a distance of 6 m. The pages are presented in pairs, one above the other. One page in each pair contains gratings and the other is blank, but the pages have the same mean reflectance. The subject is simply required to choose which page, top or bottom, contains the grating. The pages are shown in order of descending contrast and are stopped when the first error is made. Four descending series are shown separately to each eye. When no error is made at plate 10, then a score of 11 is given. Depending upon the total score of the patient from four series, the contrast sensitivity is noted from the conversion table.

3. Pelli-Robson contrast sensitivity chart[42]

This chart consists of letters that subtend an angle of 3 at a distance of 1 m. The chart is printed on both the sides. The two sides will have different size of letters. The letters on chart are organized as triplets, there being two triplets in each line. The contrast value decreases from one triple to other. The log contrast sensitivity range from 0.00 to 2.25.

To perform the test, the chart is hung on the wall, so that its centre is approximately at the level of the subject's eye as possible, so that the luminance is set at level of 60 and 120 cd/m^2.The luminance is determined with the help of a light meter.

While recording, the subject sits directly in front of the chart at a distance of 1 m (with the best distance correction). The subject is made to name or outline each letter on the chart, starting from the upper to lower line by reading across horizontally . Subject is made to guess, even when he or she believes that the letters are invisible. The test is concluded when the subject guesses two of the three letters of the triplet incorrectly.the score is given if he or she read two or three letters correctly.

4. The Vistech chart

This chart consists of sine wave gratings and is used at a distance of 3 m from the subject. In this test, contrast is assessed at several spatial frequencies (distance of the separation of the grating bars) and the subject has to identify the orientation of the grating, i.e. whether vertical or 15 clockwise, or anticlockwise.

5.Functional Acuity Contrast Test[62,63]:

It was first developed by **Dr.Arthur.P.Ginsburg**,who is the pioneer in contrast sensitivity technology.It offers more sensitive and comprehensive measure functional vision than standard Snellen acuity.

Normal snellen acuity tests only the high contrast letters.It is for detecting refractive errors but it fails to analyse early visual loss due to glaucoma,cataract,macular and retinal dysfunction,optic nerve disease etc.,

Real world doesn't have only high contrast black and white.Rather ,it consists of different conditions such as fog,nighttime,bright sun etc.,Many visual disorders will show significant visual loss under these conditions.

It is measured using **Stereoptical Optec 6500P FVA®**

It was done with illumination as recommended by the manufacturer

It has **sine wave gratings** with stepwise increase in size .It has five rows A,B,C,D and E with corresponding spatial frequencies **1.5,3,6,12 and 18** cycles per degree(cpd) respectively.

The contrast between each grating is **0.15 log units**.

Glare were produced by light source with in the instrument.luminance used as recommended by manufacturer.

The patient is shown the rows A,B,C,D and E.Each row will have nine responses.the responses were recorded for each rows.

The values are first recorded for individual eyes and then for both eyes in day and night situations,with and without glare.

The values are recorded in FACT recording form.

The values are converted to Logirthamic contrast values

GLARE:

The bright light will be uncomfortable to person and it may lead to loss of visual function known as ***disability glare***.It is due to excessive scatter produced by bright light.

Clinically it measured by reduced visual acuity or contrast sensivity with external glare source.

The tests to measure disability glare are:

1.Miller-Nadler Glare test

2.Brightness acuity test

3.Vistech MCT8000 test

4.Stereoptical Optec 6500P FVA

NEURAL MECHANISMS OF CONTRAST SENSITIVITY

Campbell and Green[43] stated that" the concept of different visual channels for handling information about different bands if spatial frequencies. This concept indicates that retina is non-uniform; Fovea is specialized for high acuity and is responsible for high spatial frequencies. In the retinal periphery, only low-frequency channels are represented. For coarse gratings, central and peripheral retina have equal contrast sensitivity

per unit area of retina, but the larger the retinal area stimulated the grater is the sensitivity, Thus, contrast sensitivity will be reduced in peripheral retinal diseases, and the use of low-frequency grating would provide rapid check of peripheral retinal function."

Further, **Campbell and Robson**[43] proposed that " the existence of linearly operating independent mechanisms within the nervous system which are selectively sensitive to the orientation to limited range of spatial frequencies. The orientation selectivity and the interocular transfer of the adaptation effect implicated the visual cortex as the site of these neurons. They attempted to explain the preliminary and essential role of such interactions in the recognition of complex images and generalization for magnifications."

FACTORS AFFECTING CONTRAT SENSITIVITY[33,34]

1. **Refractive errors.** the refractive errors affect only the higher frequencies.

2. **Age.** There occurs a definite decrease in contrast sensitivity with increasing age.

3. **Lenticular changes**. Early lens changes can reduce contrast sensitivity essentially for low spatial frequencies. This decrease in contrast sensitivity is not related to visual acuity.

4. **Ocular and systemic diseases**. Contrast sensitivity is also found to be affected by various ophthalmic as well as systemic diseases. It is decreased in

cases with retinal, optic nerve and visual pathway diseases, glaucoma, ocular hypertension, retrobulbar neuritis, multiple sclerosis, amblyopia, diabetes mellitus, pituitary adenoma, etc.

DIAGNOSTIC APPLICATIONS

The contrast sensitivity function, in recent years, has become popular as a possible diagnostic indicator of visual function. Deviations from normal standards have been reported in a number of conditions; some of which are listed above. It has been reported that contrast sensitivity (modulation transfer functions) may provide a fairly complete statement of the relations among spatial frequency or the fineness of visual details, the contrast required for resolution of detail and the luminance of the stimulus.

TESTS FOR POTENTIAL VISION[33,34]

Tests for potential vision have been developed in an effort to determine whether the individuals with obvious impaired vision have a potential to see well after the cataract surgery (i.e. whether the significant cause of their visual impairment is cataract of any other associated retinal pathology). Various subjective and objective tests are available for this purpose. Interferometry and potential acuity meter (PAM) tests are currently the most popular one and it is said to be the most accurate in predicting visual acuity in patients with cataracts

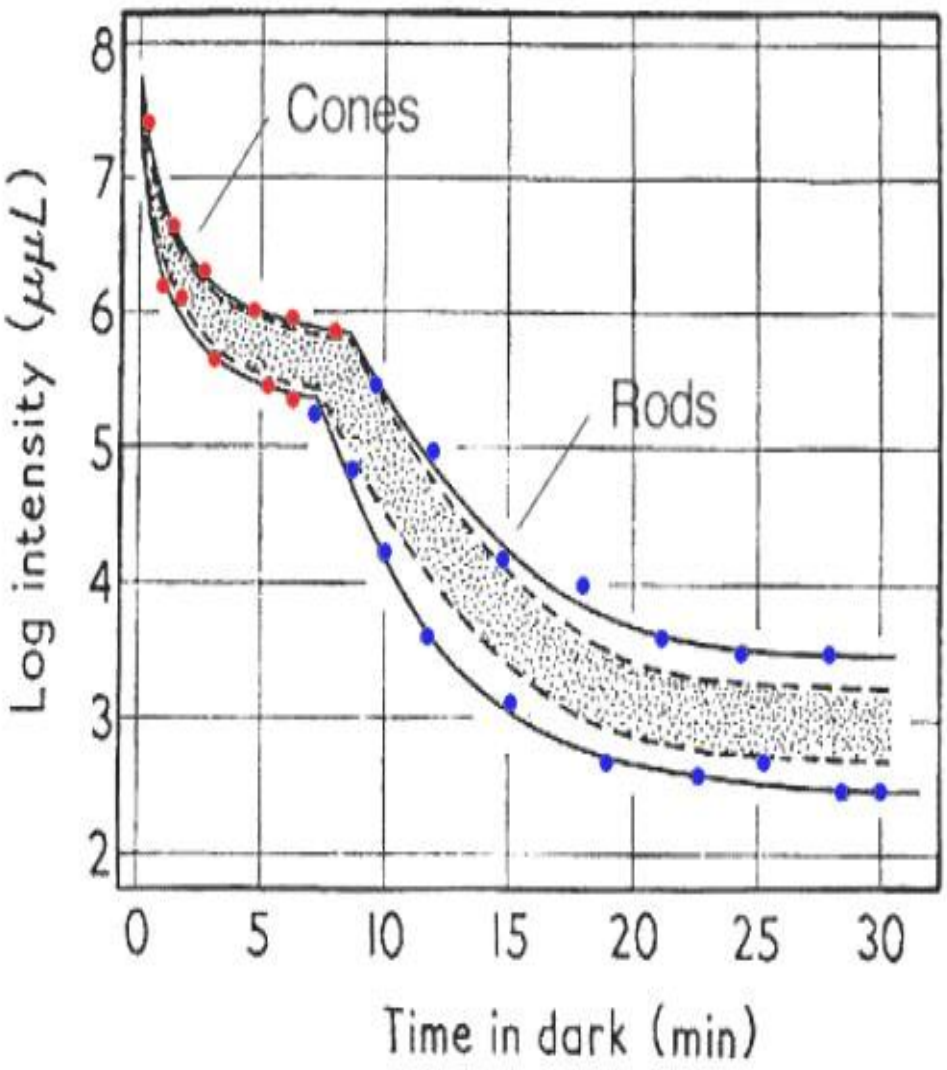
VISUAL ADAPTATIONS

The level at which light can just barely be detected is only one billionth of the level at which exposure to light may cause injury.There is different level of illuminaton in normal life,human eye has to adapt and function normally.It has both light and dark adaptation. The terms light and dark adaptation are relative and indicate the change in sensitivity which the retina is making, rather than any static condition. For example, if the illumination in a room is that of moderate daylight than and a room is that of moderate daylight and person goes not into the sunshine, his retina undergoes light adaptation. On the contrary, if the person form same room with moderate day light illumination goes into a dark room, his retina under goes dark adaptation. The change which takes place is always that which best enables the retina to function under the new condition.

DARK ADAPTATION[53,54,57]

The power of eye to adjust itself to decreasing order of illumination is called dark adaptation.the taken to adapt eye to see in dim illumination is called dark adaptation time.Rods are the principle sensitive organs of dim illumination.The rods are used in scotopic vision and cones in photopic vision.

Dark Adaptation Curve:



To get a Dark-Adaptation Curve,subject is pre adapted to light for 5 minutes, then threshold is measured over time.Initially there is rapid decline in threshold followed by slow decline

Temporal summation: Bloch's law of vision[56,61]

The completely dark adapted retina needs to absorb - several quanta of light within a restricted time and area before a sensation can be elicited. The critical period of temporal summation is about 0.1 seconds. During this period, a given amount of luminous energy will have the same effect, regardless of its distribution in time. This is Bloch's law, which can be expressed as Bt - k, where B is the luminance.t- the duration of the. stimulus, and k a constant. Beyond the critical duration, temporal summation does not occur and the effect of a test light becomes dependant on its luminance alone. The critical period varies with stimulus size, background luminance, the type of task (about 0.1 s for detection, 0.4 s for discrimination) and wavelength (about 0.25 s for blue targets, 0.1 s for red.

The Broca-Sulzer and Troxler effects [56,61]

The Broca-Sulzer effect,when a light is turned on, there is a critical period during which its apparent brightness undergoes temporal summation; the apparent brightness falls to a plateau once the critical period has expired. This is why a short flash (shorter than the critical period, so that no plateau is reached) can appear brighter than a longer flash of the same luminance. This is the **Broca-Sulzer effect**.

The **Troxler effect**. It occurs when a spot of light is projected on to the retina and held completely stationary. The light appears to fade away and disappears, and because this can occur without the bleaching of an appreciable fraction of retinal photopigment, a neural rather than photochemical mechanism is likely.

Factors influencing Dark Adaptation[54]

1. Luminance (intensity) of the preadapting light
2. Duration of the light used to preadapt the eye
3. Energy of the light used to preadapt the eye
4. Wavelength distribution (colour) of the adapting light
5. Wavelength (colour) of the test stimulus
6. Duration of exposure of retina to test flash
7. Region of the retina where test stimulus is applied
8. Vitamin A deficiency
9. Effects of anoxia on dark adaptation
10. Effect of tobacco inhalation
11. Effect of anaesthesia on dark adaptation
12. Effect of opacities in ocular media on the dark adaptation curve
13. Dark adaptation in retinal degenerations
14. Dark adaptation in myopia
15. Dark adaptation in glaucoma

LIGHT ADAPTATION[55,56]

When a person moves from dim to bright light eye adapts itself to increasing order of illumination by changes in the retinal sensitivity called Light adaptation.

The visual system must detect contrast over a huge range of light intensities at least 12 log units. The area of the pupil can vary only 16-fold (1.3 log units) and therefore its role in visual adaptation is limited. Light adaptation is a form of "automatic gain control". Over a range of at least 3 log units of cone function, the intensity increment required for detection, DI, where DI/I is a constant, is known as the **Weber-Fechner relation**, and the constant is called the Weber fraction. The relationship breaks down at higher light levels, when saturation occurs. Light adaptation works very quickly, gets faster as background intensity increases and is dependent on calcium Ion flux; it is abolished when calcium is buffered inside photoreceptors. The light adapted eye is maximally sensitive at about 555 nm.

Time course of Light adaptation are

1.Anticipatory effect

2.Transient effect

3.Photochemical effect

COLOUR VISION[33,34]

It is the ability of eye to differentiate colours in different wavelengths.Some broad facts about colour vision are as follows:

- Colour vision is the inherited property of cones(photopic vision).
- Colour is a perceptual phenomenon, not just a physical property of an object. Many factors determine the colour perceived: the spectral composition of light from the object is important, but the spectral composition of light from the visual surroundings and the state of light adaptation of the eye also contributes.
- The sensation of colour is subjective. Individuals are taught names for their colour sensations and subsequently use these names whenever the same sensation is obtained.
- There are three different types of cones viz. red sensitive, green sensitive and blue sensitive, which combinedly perform the function of colour vision.
- All colours are a result of admixture in different proportion of three primary colours: the red (723- 647 nm), green (575-492 nm) and blue (392-450 nm).
- Colours have three attributes: hue, intensity and saturation.
- For any colour there is a complementary colour that, when properly mixed with it, produces a sensation of white.

- The colour perceived depends up on the background of object.
- A normal person can see all wavelengths between violet to red. If the wavelength is shorter than that of violet, the light becomes ultraviolet (UV) and is beyond visibility. If the wavelength is greater than 750 nm, the light is infrared and is again beyond visibility. Human beings could have seen even UV light as blue cones retain some sensitivity at around 10 nm, but crystalline lens blocks all UV rays.Consequently, after cataract operation, one can see the UV rays to some extent.
- In, dim light,colours appear as gray; that is called Purkinje shift phenomenon.

Theories of colour vision[48,49]

1.Trichromatic theory

2.Opponent theory of Herring

Tests for colour vision[33,34]**:**

1. Pseudo isochromatic chart test
2. Hardy rand rittler test
3. The lantern test
4. Fransworth-Munsell 100 hue test
5. City University colour vision test
6. Nagels anomaloscope test
7. Holmgrens wool test

8. D-15 test
9. PV-16 test
10. Lantorn test
11. The new colour test
12. Colour vision testing made easy

DEVELOPMENT OF IND-VFQ33[64,65]

"Development of The Indian Vision function questionnaire: field testing and psychometric evaluation" by RD Thulasiraj et al[64]

For the development of IND-VFQ33,Patients with eye diseases like cataract, glaucoma, diabetic retinopathy and age related macular degeneration were recruited from leading eye hospitals in three centres in India (Delhi, Hyderabad and Madurai)

Their main objective was to develop and evaluate the validity, responsiveness, repeatability, accuracy of questionnaire

It is a 33 item questionnaire (IND-VFQ33) which addresses patient visual problems in real life activities.

It is an interviewer administered questionnaire.Questionnaire items included are

"1.General functioning scale

2.Psychosocial impact scale

3.Visual symptoms scale"

S K Gupta et al stated that "It showed better convergent validity compared to visual acuity

It produces separate summary scores for each scale rather than total score Responsiveness were directed to cataract patients since cataract surgery provides clear intervention of known efficacy compared to other diseases

They showed that IND-VFQ33 was practically,scientifically good measure to evaluate vision related quality of life in clinical studies,drug trials and in epidemiological studies in South Asia

Further modifications of IND-VFQ require changes in content,format and translation in to other languages"

VALIDTION OF IND-VFQ33:

"**The Impact Of Severity of Vision loss on Vision-related Quality of life in India: An evaluation of The IND-VFQ33)" by RP Finger et al**[70]

It is the cross-sectional, observational study done in cataract patients enrolled from One of the south Indian eye hospital

Their objective was to evaluate IND-VFQ33 questionnaire and identify the correlation between Vision impairement and Quality of life

Instead of three scales as used in IND-VFQ33, “they used four scales general functioning scale with vision specific mobility,activity limitation,psychosocial scale,visual symptoms scale”

They studied visual impairment as mild,moderate,severe

They found “ severe visual impairment and blindness is directly associated with vision specific mobility and activity limitation”

Mild visual impairment is not related to reduction in vision functioning

They didn’t found association between vision disability and emotional level as mentioned in many studies

Their four sub-scales showed accurate targetting and suggests that patients had higher ability in perfoming than with three scales

They concluded that IND-VFQ33 is a valid questionnaire to assess quality of life related to vision problems

LITERATURE REVIEW

1.Gariner AM et al studied "the relation between visual function and visual daiasbility in uveitis patients"[75]

This is one of the very few studies done to assess visual function in Uveitis patients.132 patients of uveitis were enrolled to the study.They compared the low and high contrast visual acuity by Log MAR letters using a Bailey-Love chart and contrast sensitivity with vision related quality of life assessed using Vision specific Quality Of Life (VQOL) questionnaire.they studied both monocularly and binocularly

The study concluded that Binocular contrast sensitivity is the best measure to measure the visual function in uveitis patients in real situations.the young patients with poor binocular visual acuity had worst quality of life

2.Rhelt M et al studied " the visual function and general health status in apatients with uveitis"[72]

This study has been done at National Eye Institute,Bethesda using the most popular – "the medical outcomes study 36,Item short form (SF-36) and National Eye Institute Visual function questionnaire (NEI VFQ-25)".The study assessed and compared visual function with the general health status in patients with uveitis and normal population.Visual acuity and type of uveitis

and treatment offered were also noted.Patient's co-morbidity was also assessed.

Overall 76 patients were included.The NEI VFQ-25 score was significantly lower among patients with uveitis than in the normal population($p<0.001$).Visual acuity,Binocular involvement,type of therapy and SF36 Physical (PCS) and Mental(MCS) component summary scores were all significantly associated with overall NEI VFQ-25 scores in multivariate analysis.

This study revealed that uveitis affects the visual functioning and general health of the patients.More severe the disease more pronounced is the fall in visual functioning scores.

The both visual function and general health status measure contribute additional information and both should be performed in uveitis patients to measure the effectiveness of therapy and disease

3.Shiela T.Angeles-Han et al studied "the visual function and quality of life in children with uveitis"[77]

In this study they analysed the impact of physical and visual disability on QOLin children with and without uveitis in Juvenile idiopathic Arthritis(JIA).

The QOL questionnaire were administered to 27 children to measure physical and visual function.

They concluded that visual impairment is an important tool to measure QOL in children with JIA uveitis.They also suggest to include visual and physical function in quality of life assessment in children with uveitis.

4.C C Murphy et al studied " the visual function and quality of life in intermediate uveitis"[76]

In this study they assessed visual function and Vision related quality of life(VR-QOL) and general health related quality of life(HR-QOL) in Intermediate Uveitis

In 42 patients,VR-QOL and HR-QOL evaluated using VCM1 and SF-36 questionnaires respectively.Log MAR visual acuity,Pelli-Robson Contrast sensitivity Farnsworth-Munsell 100 Hue colour vision and Estermann visual field were recorded monocularly and binocularly.

They concluded that majority of patients with Intermediate Uveitis maintain god visual function and quality of life.Impaired VR-QOL and HR-QOL correlates with worse eye with Intermediate Uveitis.

5.Janine Scherrer et al studied "the visual function in toxoplasmosis associated uveitis"[78]

In this study they assessed visual function with visual acuity and visual fields.

They studied 61 patients with inactive state Toxoplasmosis. Ophthalmic examination,Fundus photography and Octopus perimetry were done in each patients.

They have concluded that " in Inactive Ocular Toxoplasmosis , permanent visual field defects seen in >94% of the eyes.Standard automated perimetry may better reflect the functional damage than visual acuity".

6.Arvind venkatraman et al studied "A pre and post treatment evaluation of quality of life in patients with Uveitis"[79]

They studied the effect of treatment on vision-related quality of life (VR-QOL) in uveitis patients

They showed that chronic uveitis had better improvement in visual ability compared to acute uveitis.

They conclude that VR-QOL measure showed greater sensitivity in determining disability of patients compared to the clinical or demographic details and also there is a high correlation between the visual acuity and quality of life in uveitis in response to the treatment.

AIMS AND OBJECTIVES

The Aim of the study is

1. To assess the visual function in patients with uveitis by measuring Visual acuity,Contrast sensitivity(Day or Photopic) and (Night or scotopic),both measured with and without Glare,Monocularly and binocularly (Pre and Post treatment).

2. To assess the Vision related Quality of Life(VR-QOL) in patients with uveitis(Pre and Post treatment) using IND-VFQ33 Questionnaire.

3. To Correlate the assessed Visual function with Vision related related Quality of Life(VR-QOL) in patients with uveitis(Pre and Post treatment).

MATERIALS AND METHODS

Study design:

Single centre,single examiner /interviewer based Prospective study

Study Place:

Uveitis clinic

Study period:

Between September 2013 and August 2014

Approval:

The study was approved by **Hospital ethics committee**

Inclusion Criteria:

Age 16 years and above

Newly diagnosed case of uveitis

Patient who were able to perform the test.

Patient who are willing to participate.

Exclusion criteria:

Age less than 16 years.

Patients who were previously diagnosed as a case of uveitis and on treatment.

Patient who are unable to perform the test.

Patients with pre-existing ocular conditions like Cataract,Diabetic retinopathy, ARMD and other macular disorders, Retinal detinal detachment, glaucoma, optic nerve disorders, corneal pathology, amblyopia, low vision etc.,

Patient with history of refractive surgical procedures like LASIK, Femto LASIKetc.,and Vitreo-retinal surgeries.

Patient having speech or hearing problems.and who have non-visual physical disabilities.

Patient who are not turned for follow up.

Age group of 16 and above were selected,since the questionnaire has been developed for the adult population.

The patients who have unilateral or bilateral disease either Anterior uveitis,Intermediate uveitis,posterior uveitis or Pan uveitis were included in the study

The patients included in the study were explained in detail about the study,questionnaires and purpose.

All the patients were thoroughly examined,refraction done for all patient to find out Best Corrected Visual Acuity and other ocular examination include Intraocular pressure measurement,Slit lamp examination +90 D Fundus examination and Indirect ophthalmoscope examination and investigations necessary for diagnosis were done.Demographic,Clinical examination details were recorded in data sheet.

Contrast sensitivity and Vision related quality of life assessment were assessed after the confirmation of diagnosis.If the patients requires mydriatic and cycloplegics,the tests were carried out in the same conditions.these were assessed in patients under real time situations.

Treatment given were also recorded**.**

Patient was advised to come for follow up in about one month,there were variation on situation warranted but the response was recorded during the visit around one month time.

The patient who came for follow up were examined.Best Corrected Visual acuity,Contrast sensitivity and vision related Quality of life (VR-QOL) were assessed in similar fashion which was done before the commencement of treatment.

Patients were asked whether they were using medications regularly as per the advise.

If need the therapy was modified or withdrawn as the individual cases needed.

A new case of uveitis is defined as one with no previous treatment with topical,systemic steroids or immunosupressions,because visual function and quality of life could have been very much altered by the therapeutic intervention,however they need to be excluded.

Patients who were unable to read the letters in snellen's chart in one or both eyes were excluded.

Patients with other ocular conditions like cataract,diabetic retinopathy,macular disorders etc., will significantly affect the test were excluded.

Patients with previous history of refractive procedures like LASIK etc., and Vitreo-retinal surgeries will significantly affect the test were excluded.

Patients who have physical disability,speech or hearing problems were excluded.

Patients who are not willing to participate,not willing for followup were excluded.

Clinical Examination:

A detailed clinical examination and investigations as mentioned was done and anatomical diagnosis was arrived as Anterior uveitis or Intermediate uveitis or Posterior uveitis or Panuveitis.

Visual function Assessment:

Visual function assessed are Visual Acuity(VA) and Contrast Sensitivity(Day) and Contrast sensitivity(Night) measured both with and without glare .these were assessed after best corrected spectacle correction .it was done first monocularly then binocularly.

Visual Acuity(VA)

Visual acuity was measured using Standard Snellen's chart at 3 metre distance.Refraction was done.Best corrected Visual Acuity(BCVA) was measured in individual eyes .It was recorded in Snellen's notation and was converted in to **LogMAR** equivalents.

Contrast Sensitivity(CS)

Contrast Sensitivity for distant vision was measured in day(photopic) and night (scotopic) situations.Both day and night contrast sensitivity were assessed with glare and without glare.It was first done in individual eyes and then both eyes.

Contrast Sensitivity(CS) was measured by Functional Acuity Contrast Test using **Stereoptical Optec 6500P FVA®**.It was done with illumination as recommended by the manufacturer

It has sine wave gratings with stepwise increase in size .It has five rows A,B,C,D and E with corresponding spatial frequencies **1.5,3,6,12 and 18** cycles per degree(cpd) respectively.The contrast between each grating is **0.15 log units**.**Glare** were produced by light source with in the instrument.luminance used as recommended by manufacturer. The patient is shown the rows A,B,C,D and E.Each row will have nine responses.The responses were recorded for each rows.

The values are first recorded for individual eyes and then for both eyes in day and night situations,with and without glare.The values are recorded in Functional Acuity Contrast Test(FACT) recording form(Annexed).

The values are converted to **Logirthamic contrast values**.The values are entered in to the Data sheet.

Vision related quality of life Assessment:

It was assessed using

Indian Visual Function Questionnaire 33(**IND-VFQ 33**).It is a 33 item questionnaire.It has three scales

1.General functioning questions(question 1 to 21)

2.Psychosocial questions(question 22 to 26)

3.Visual symptoms questions(question 27 to 33)

The questions were administered to patients by single interviewer.The response is recorded for each scale in th recording form.

The response is recorded as follows:

For **General functioning scale:**

0-Not at all

1-A little

2-Quite a bit

3-A lot

4-Cannot do this because of my sight

For **Psychosocial impact and Visual symptoms scale:**

0-Not at all

1-A little

2-Quite a bit

3-A lot

The responses recorded in the form are entered in to the data sheet.It is done for pre and post treatment in patients with uveitis

DATA ANALYSIS

Mean (SD) and Frequency (percentage) was used for continuous and categorical variables respectively.

Student t-test or Mann-whitney U test was used to test mean difference between the two continuous variables.

Paired t-test or Wilcoxon rank sum test was used to assess the difference between pre and post mean values.

P-value is less than 0.05 considered as statistically significant.

All statistical analysis was done by statistical software STATA 11.0.

The values obtained are tabulated

Graphs and charts made from tables

RESULTS

DEMOGRAPHIC VALUES

54 patients were included in this study.108 eyes of 54 patients were studied

Age

Mean (SD) of the age at the presentation is 32.31(8.04)years and the range is between 16 – 48 years

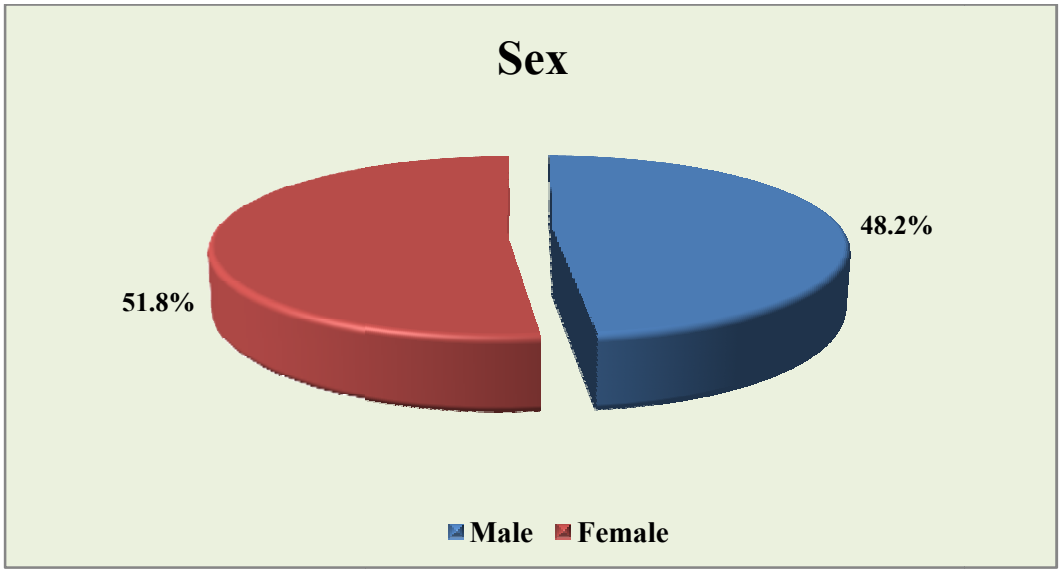
Eye

Eye	n	%
Right	42	52.5
Left	28	47.5
Total	80	100.0

80 eyes out of 108 were affected.Right eye more affected compared to the left eye

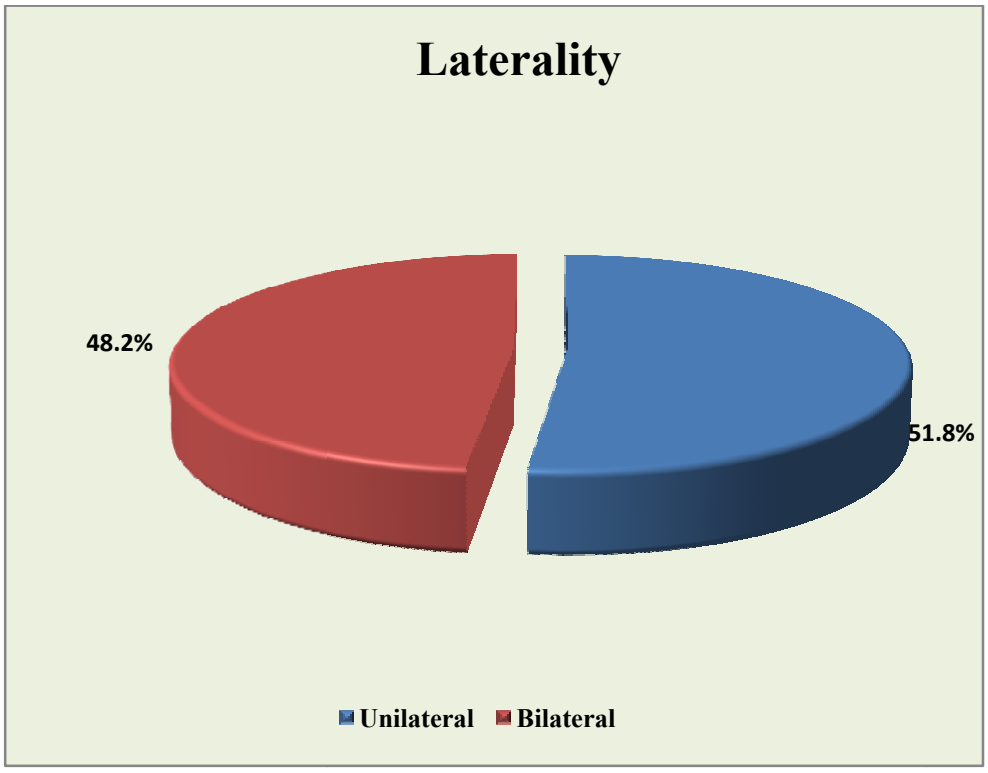
Sex

Sex	n	%
Male	26	48.2
Female	28	51.8
Total	54	100.0



Laterality

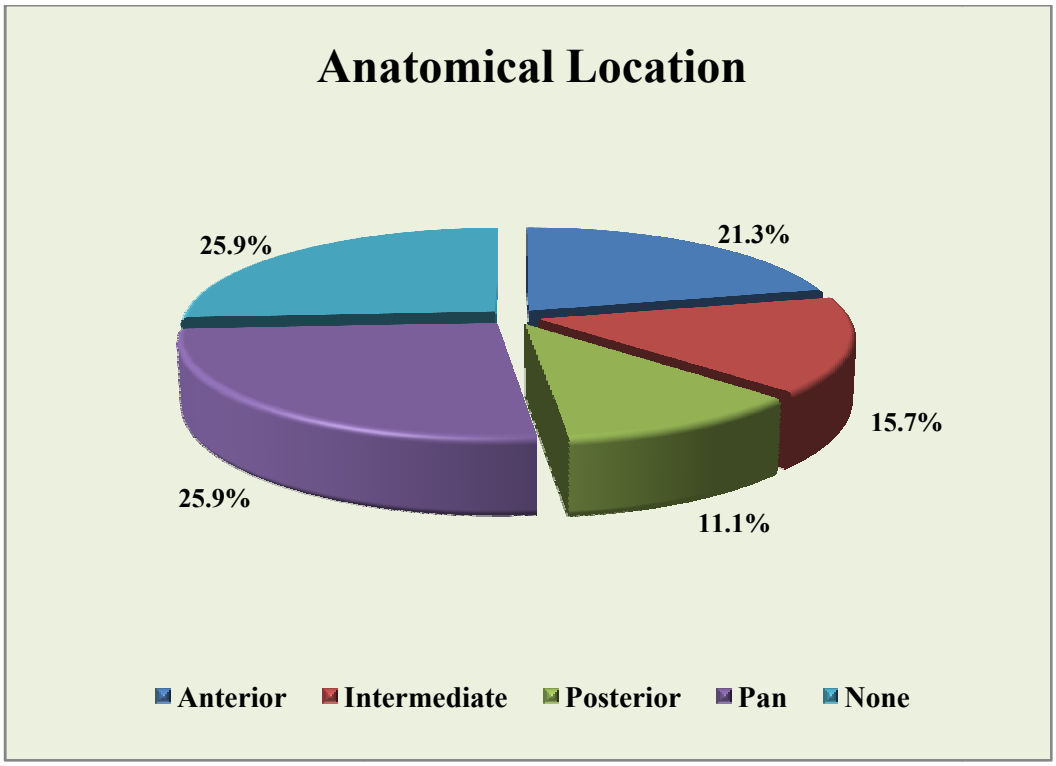
Laterality	n	%
Unilateral	28	51.8
Bilateral	26	48.2
Total	54	100.0



Uveitis is unilaterally affected in 28 patients and bilaterally affected in 26 patients

Anatomical location

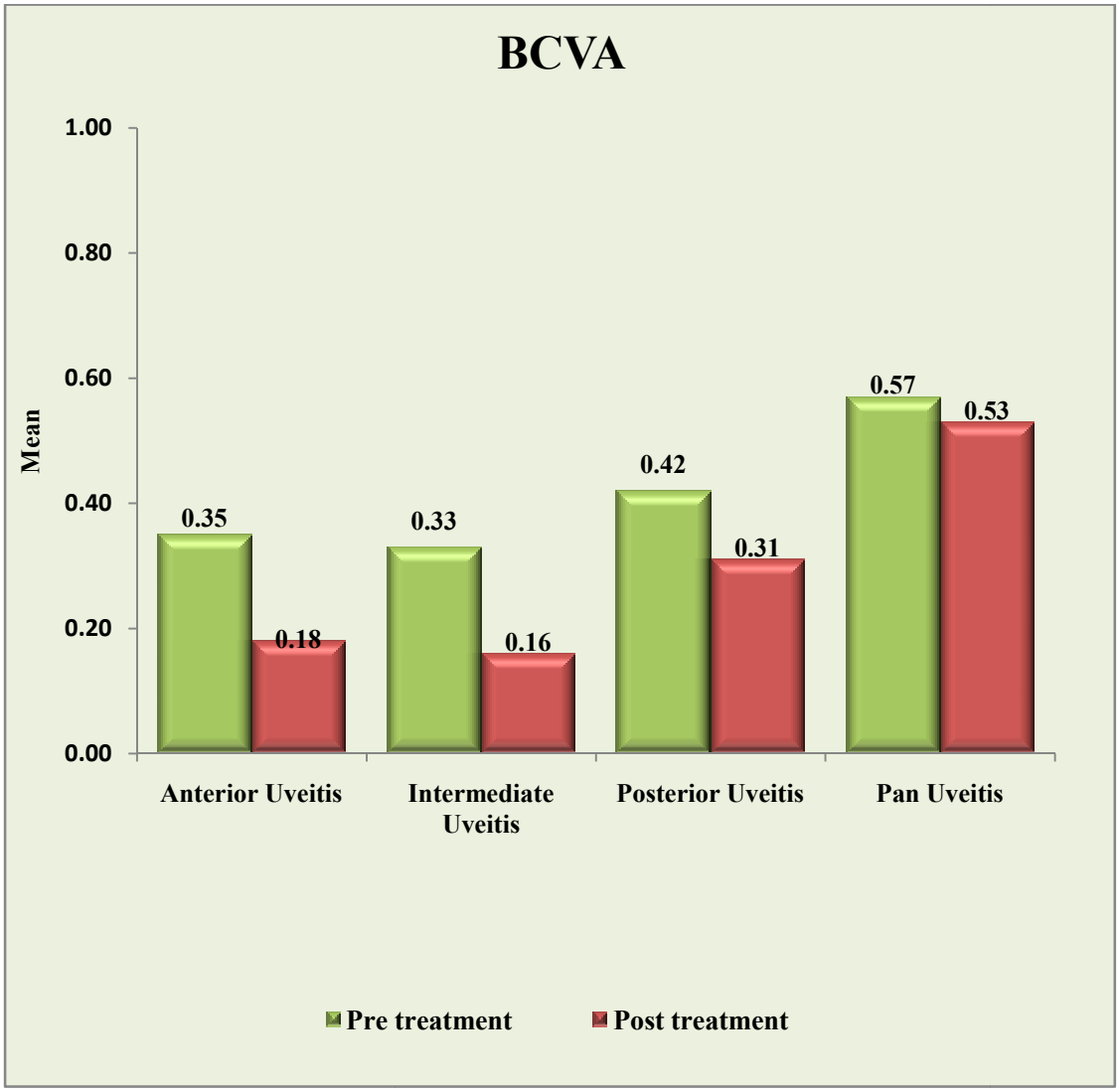
Anatomical location	n	%
Anterior uveitis	23	21.3
Intermediate uveitis	17	15.7
Posterior uveitis	12	11.1
Panuveitis	28	25.9
Unaffected eyes	28	25.9
Total	108	100.0



Panuveitis is most commonly affected followed by anterior uveitis, intermediate uveitis and posterior uveitis

Pre and Post treatment evaluation of BCVA based on Anatomical location

Anatomical location	BCVA				
	n	Mean(SD) Log MAR	Median (Snellen's equivalent)	Min – Max	P-value
Anterior uveitis					
Pre treatment	23	0.35(0.19)	0.3(6/12)	0.18 – 0.6	0.0051
Post treatment	23	0.18(0.25)	0.18(6/9)	0 – 0.78	
Intermediate uveitis					
Pre treatment	17	0.33(0.07)	0.3(6/12)	0.3 – 0.48	0.0002
Post treatment	17	0.16(0.11)	0.18(6/9)	0 – 0.48	
Posterior uveitis					
Pre treatment	12	0.42(0.16)	0.39(6/15)	0.18 – 0.6	0.1100
Post treatment	12	0.31(0.16)	0.3(6/12)	0 – 0.6	
Pan uveitis					
Pre treatment	28	0.57(0.16)	0.54(6/24)	0.3 – 0.78	0.5833
Post treatment	28	0.53(0.27)	0.6(6/24)	0.18 – 1	
Total					
Pre treatment	80	0.43(0.19)	0.48(6/18)	0 – 0.78	0.0001
Post treatment	80	0.32(0.28)	0.18(6/9)	0 – 1	



Assessment of Visual Acuity based on Anatomical location

Analysis of Best Corrected Visual acuity in uveitis based on anatomical location showed that there is a significant improvement in visual acuity post treatment in Anterior uveitis and Intermediate uveitis.

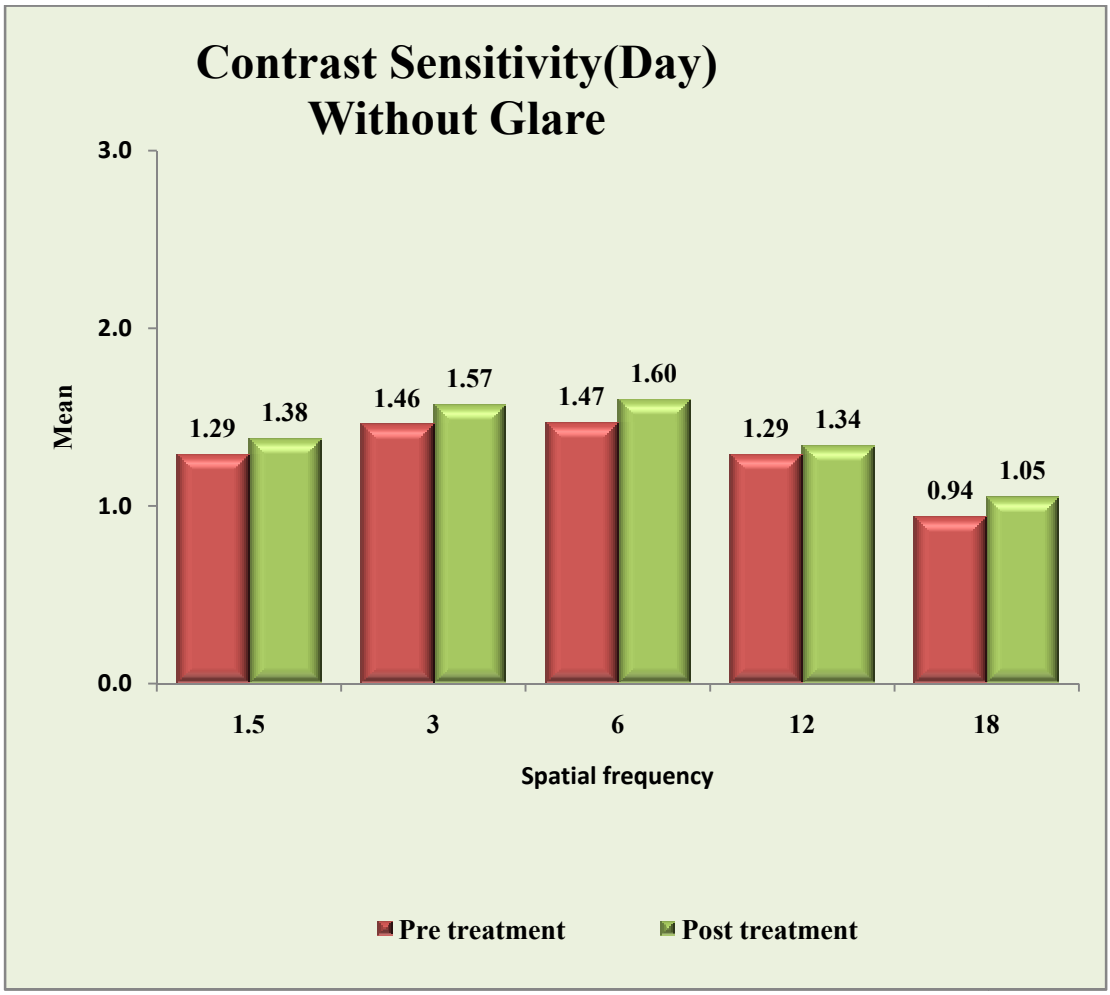
There is no significant improvement in visual acuity post treatment in Posterior and panuveitis

Overall there is an improvement in visual acuity post treatment

Contrast sensitivity assessment (Day) in affected eyes

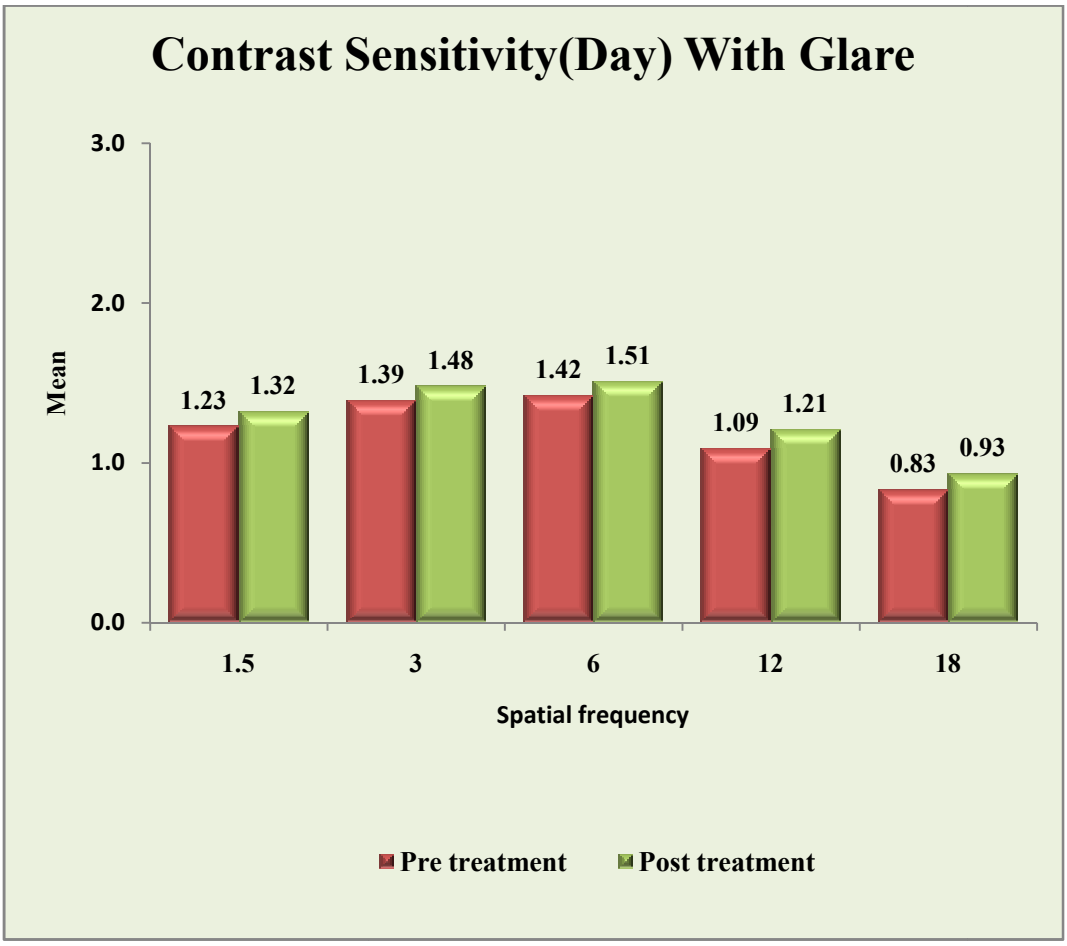
Contrast sensitivity (Day)	Pre treatment		Post treatment		P-value
	Mean(SD)	*Min – Max*	*Mean(SD)*	*Min – Max*	
Without glare					
Spatial frequency					
1.5	1.29(0.16)	1.11 – 1.7	1.38(0.29)	0.85 – 1.7	0.003
3	1.46(0.20)	1.18 – 2.06	1.57(0.29)	1 – 2.06	0.007
6	1.47(0.21)	1.2 – 2.11	1.60(0.30)	1.08 –2.11	0.001
12	1.29(0.21)	1.04 – 1.78	1.34(0.44)	0 – 1.78	0.286
18	0.94(0.36)	0 – 1.52	1.05(0.44)	0 – 1.52	0.052
With glare					
Spatial frequency					
1.5	1.23(0.20)	0.95 – 1.7	1.32(0.36)	0 – 1.7	0.030
3	1.39(0.22)	1 – 2.06	1.48(0.39)	0 – 2.06	0.051
6	1.42(0.23)	1.08 – 2.11	1.51(0.39)	0 – 2.11	0.024
12	1.09(0.44)	0 – 1.78	1.21(0.55)	0 – 1.78	0.114
18	0.83(0.43)	0 – 1.52	0.93(0.53)	0 – 1.52	0.164

Contrast sensitivity(Day) without glare in affected eyes



The overall assessment of contrast sensitivity in day time situations with out glare with log contrast values showed that there is significant improvement in spatial frequencies of 1.5,3,6 cpd post treatment but there is no significant improvement in contrast sensitivity at higher spatial frequencies such as 12 and 18 cpd

Contrast sensitivity(Day) with glare in affected eyes



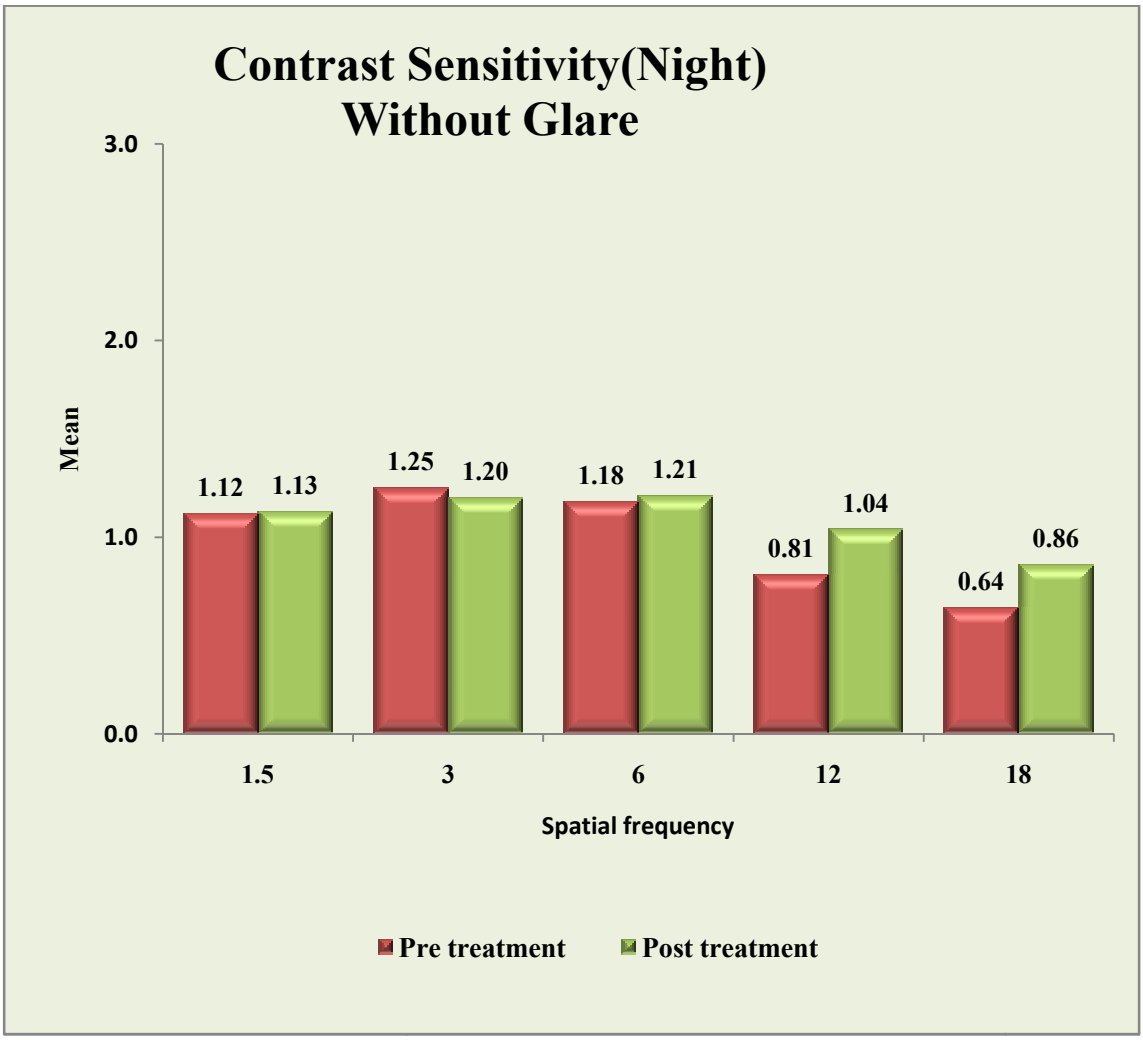
The overall assessment of contrast sensitivity in day time situations with glare with log contrast values showed that there is no significant improvement in contrast sensitivity at all spatial frequencies.

In this condition contrast sensitivity at higher spatial frequencies such as 12 and 18 are highly affected.

Contrast sensitivity Assessment (Night) in affected eyes

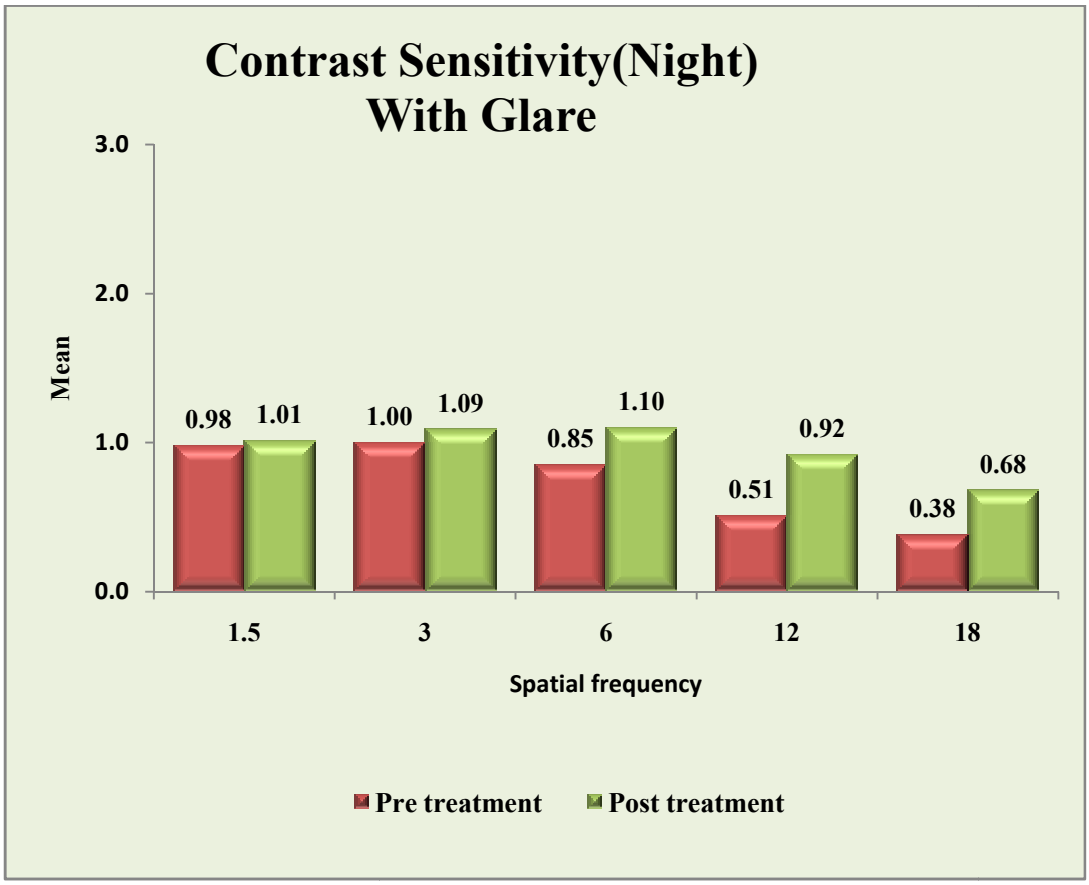
Contrast sensitivity (Night)	Pre treatment		Post treatment		P-value
	Mean(SD)	*Min – Max*	*Mean(SD)*	*Min – Max*	
Without glare					
Spatial frequency					
1.5	1.12(0.30)	0 – 1.7	1.13(0.57)	0 – 1.7	0.879
3	1.25(0.33)	0 – 2.06	1.20(0.72)	0 – 2.06	0.468
6	1.18(0.49)	0 – 2.11	1.21(0.73)	0 – 2.11	0.707
12	0.81(0.60)	0 – 1.78	1.04(0.68)	0 – 1.78	0.013
18	0.64(0.49)	0 – 1.52	0.86(0.54)	0 – 1.52	0.001
With glare					
Spatial frequency					
1.5	0.98(0.43)	0 – 1.7	1.01(0.62)	0 – 1.7	0.604
3	1.00(0.52)	0 – 2.06	1.09(0.72)	0 – 2.06	0.302
6	0.85(0.67)	0 – 2.11	1.10(0.73)	0 – 2.11	0.006
12	0.51(0.63)	0 – 1.78	0.92(0.63)	0 – 1.78	<0.001
18	0.38(0.51)	0 – 1.52	0.68(0.53)	0 – 1.52	<0.001

Contrast sensitivity (Night) without glare in affected eyes



The overall assessment of contrast sensitivity in night time situations without glare with log contrast values showed that contrast sensitivity is highly affected at 1.5,3,and 6 cpd spatial frequencies but less affected at higher spatial frequencies(12 and 18 cpd)

Contrast sensitivity (Night) with glare in affected eyes



The overall assessment of contrast sensitivity in night time situations without glare with log contrast values showed that contrast sensitivity is highly affected at1.5 and 3 cpd spatial frequencies but less affected at 6,12 and 18 cpd spatial frequencies.

So,contrast sensitivity in affected eyes showed that it is reduced in day light with glare and night with and without glare in 1.5,3 and 6 cpd spatial frequencies. Higher spatial frequencies such as 12 and 18 cpd are least affected in night situations.

Contrast sensitivity assessment (Day) in both eyes

Contrast sensitivity (Day) Both eyes	Pre treatment		Post treatment		P-value
	Mean(SD)	*Min – Max*	*Mean(SD)*	*Min – Max*	
Without glare					
Spatial frequency					
1.5	1.37(0.17)	1.11 – 1.7	1.40(0.34)	0 – 1.7	0.523
3	1.56(0.19)	1.18 – 1.9	1.59(0.26)	1 – 1.9	0.355
6	1.55(0.19)	1.2 – 1.81	1.63(0.25)	1.08 – 1.95	0.011
12	1.37(0.18)	1.04 – 1.78	1.33(0.44)	0 – 1.78	0.567
18	1.02(0.31)	0 – 1.52	1.03(0.45)	0 – 1.52	0.958
With glare					
Spatial frequency					
1.5	1.33(0.20)	0.95 – 1.7	1.39(0.33)	0 – 1.7	0.210
3	1.52(0.21)	1 – 1.9	1.56(0.34)	0 – 1.9	0.422
6	1.50(0.21)	1.08 – 1.81	1.58(0.33)	0 – 1.95	0.079
12	1.24(0.39)	0 – 1.78	1.26(0.53)	0 – 1.78	0.830
18	0.95(0.33)	0 – 1.52	1.00(0.45)	0 – 1.52	0.493

Contrast sensitivity assessment (Night) in both eyes

Contrast sensitivity (Night) Both eyes	**Pre treatment**		**Post treatment**		**P-value**
	Mean(SD)	*Min – Max*	*Mean(SD)*	*Min – Max*	
Without glare					
Spatial frequency					
1.5	1.27(0.21)	0.85 – 1.56	1.26(0.47)	0 – 1.7	0.838
3	1.60(0.77)	1 – 4.6	1.35(0.60)	0 – 1.9	0.055
6	1.33(0.47)	0 – 1.81	1.40(0.61)	0 – 1.95	0.323
12	1.08(0.51)	0 – 1.63	1.22(0.55)	0 – 1.78	0.087
18	0.86(0.43)	0 – 1.36	1.00(0.39)	0 – 1.52	0.011
With glare					
Spatial frequency					
1.5	1.13(0.45)	0 – 1.56	1.16(0.54)	0 – 1.7	0.667
3	1.35(0.97)	0 – 4.6	1.28(0.58)	0 – 1.9	0.625
6	1.13(0.63)	0 – 1.81	1.29(0.59)	0 – 1.95	0.032
12	0.89(0.58)	0 – 1.63	1.07(0.51)	0 – 1.78	0.006
18	0.66(0.48)	0 – 1.36	0.79(0.46)	0 – 1.52	0.055

Contrast sensitivity assessment in affected eyes based on Anatomical location

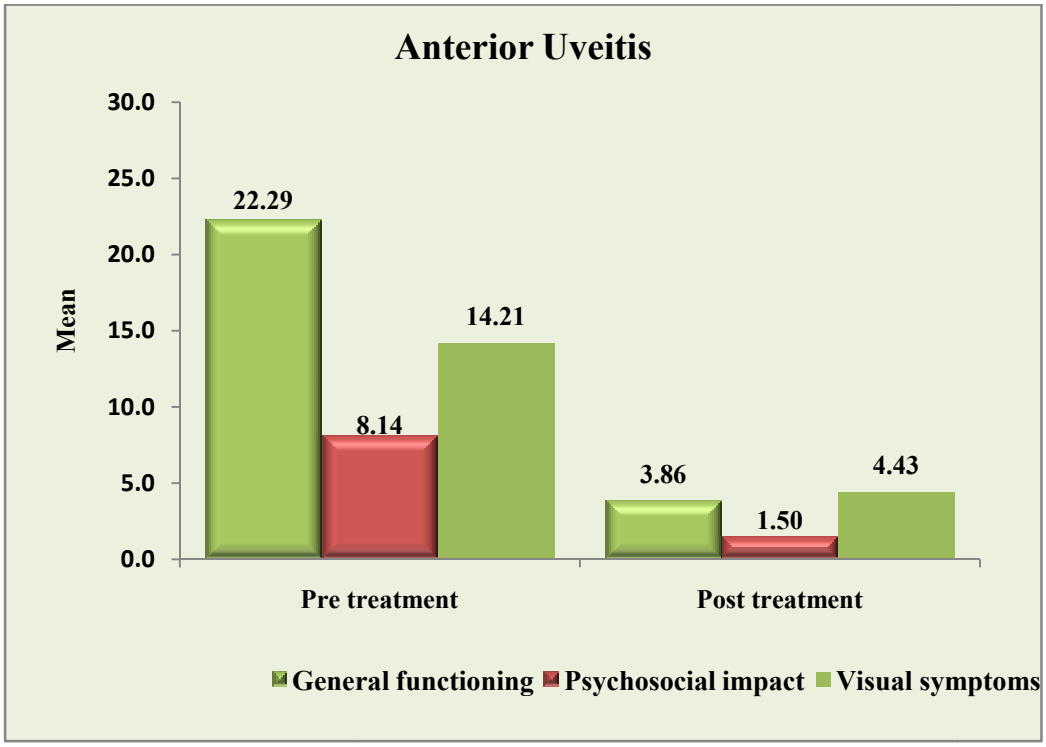
CS	Location							
	Anterior		Intermediate		Posterior		Pan	
	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment
Day								
WOG	5(21.7)	20(87.0)	6(35.3)	12(70.6)	2(16.7)	5(41.7)	-	4(14.3)
1.5	2(8.7)	20(87.0)	6(35.3)	12(70.6)	3(25.0)	5(41.7)	-	4(14.3)
3	3(13.0)	18(78.3)	6(35.3)	10(58.8)	2(16.7)	5(41.7)	-	-
6	14(60.9)	20(87.0)	14(82.4)	16(94.1)	8(66.7)	5(41.7)	2(7.1)	12(42.9)
12	14(60.9)	20(87.0)	14(82.4)	16(94.1)	8(66.7)	9(75.0)	14(50.0)	12(42.9)
18								
Day WG								
1.5	5(21.7)	16(69.6)	2(11.8)	12(70.6)	2(16.7)	5(41.7)	-	2(7.1)
3	-	13(56.5)	2(11.8)	12(70.6)	2(16.7)	5(41.7)	-	2(7.1)
6	-	13(56.5)	2(11.8)	6(35.3)	2(16.7)	5(41.7)	-	
12	10(43.5)	20(87.0)	10(58.8)	16(94.1)	7(58.3)	5(41.7)	2(7.1)	6(21.4)
18	14(60.9)	20(87.0)	10(58.8)	16(94.1)	7(58.3)	9(75.0)	10(35.7)	12(42.9)
Night								
WOG	3(13.0)	17(73.9)	-	8(47.1)	1(8.3)	3(25.0)	-	-
1.5	-	14(60.9)	-	6(35.3)	1(8.3)	2(16.7)	-	-
3	-	9(39.1)	2(11.8)	6(35.3)	1(8.3)	2(16.7)	-	-
6	11(47.8)	20(87.0)	8(47.1)	16(94.1)	5(41.7)	5(41.7)	-	10(35.7)
12	14(60.9)	20(87.0)	12(70.6)	16(94.1)	5(41.7)	9(75.0)	-	10(35.7)
18								
Night								
WG	3(13.0)	9(39.1)	-	4(23.5)	1(8.3)	3(25.0)	-	-
1.5	-	7(30.4)	-	4(23.5)	1(8.3)	1(8.3)	-	-
3	-	7(30.4)	2(11.8)	2(11.8)	1(8.3)	1(8.3)	-	-
6	8(34.8)	19(82.6)	8(47.1)	6(35.3)	1(8.3)	5(41.7)	-	2(7.1)
12	10(43.5)	19(82.6)	8(47.1)	12(70.6)	4(33.3)	5(41.7)	-	2(7.1)
18								

Contrast sensitivity assessment in both eyes based on Anatomical location

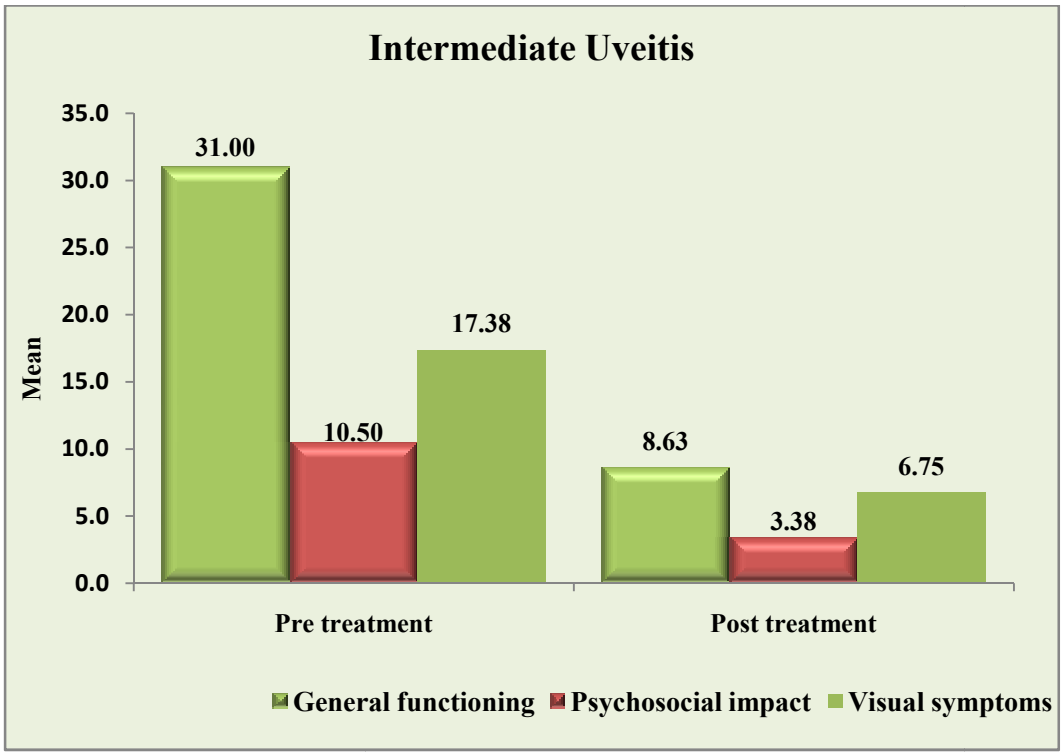
CS	Location							
	Anterior		Intermediate		Posterior		Pan	
	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment
Both eyes (n=54)								
Day WOG	5(35.7)	13(92.9)	3(37.5)	6(75.0)	5(83.3)	2(33.3)	-	2(14.3)
1.5	5(35.7)	13(92.9)	3(37.5)	6(75.0)	4(66.7)	1(16.7)	-	2(14.3)
3	1(7.1)	11(78.6)	3(37.5)	6(75.0)	3(50.0)	1(16.7)	-	-
6	12(85.7)	14(100.0)	7(87.5)	8(100.0)	6(100.0)	4(66.7)	1(7.1)	3(21.4)
12	12(85.7)	14(100.0)	7(87.5)	8(100.0)	6(100.0)	6(100.0)	7(50.0)	4(28.6)
18								
Day WG	5(35.7)	13(92.9)	1(12.5)	6(75.0)	5(83.3)	2(33.3)	-	1(7.1)
1.5	3(21.4)	13(92.9)	1(12.5)	6(75.0)	4(66.7)	1(16.7)	-	1(7.1)
3	-	10(71.4)	1(12.5)	3(37.5)	3(50.0)	1(16.7)	-	-
6	12(85.7)	13(92.9)	5(62.5)	8(100.0)	6(100.0)	3(50.0)	1(7.1)	2(14.3)
12	12(85.7)	14(100.0)	5(62.5)	8(100.0)	6(100.0)	6(100.0)	5(35.7)	5(35.7)
18								
Night WOG	4(28.6)	13(92.9)	1(12.5)	4(50.0)	1(16.7)	1(16.7)	-	-
1.5	1(7.1)	11(78.6)	1(12.5)	4(50.0)	3(50.0)	2(33.3)	-	-
3	-	10(71.4)	1(12.5)	3(37.5)	1(16.7)	2(33.3)	-	-
6	9(64.3)	13(92.9)	5(62.5)	8(100.0)	4(66.7)	2(33.3)	-	5(35.7)
12	14(100.0)	14(100.0)	7(87.5)	8(100.0)	6(100.0)	5(83.3)	-	5(35.7)
18								
Night WG	3(21.4)	10(71.4)	1(12.5)	3(37.5)	1(16.7)	1(16.7)	-	-
1.5	-	6(42.9)	1(12.5)	3(37.5)	3(50.0)	1(16.7)	-	-
3	-	4(28.6)	1(12.5)	1(12.5)	1(16.7)	1(16.7)	-	-
6	5(35.7)	11(78.6)	5(62.5)	3(37.5)	3(50.0)	1(16.7)	-	1(7.1)
12	8(57.1)	13(92.9)	5(62.5)	6(75.0)	4(66.7)	2(33.3)	-	1(7.1)
18								

Overall assessment of Contrast sensitivity

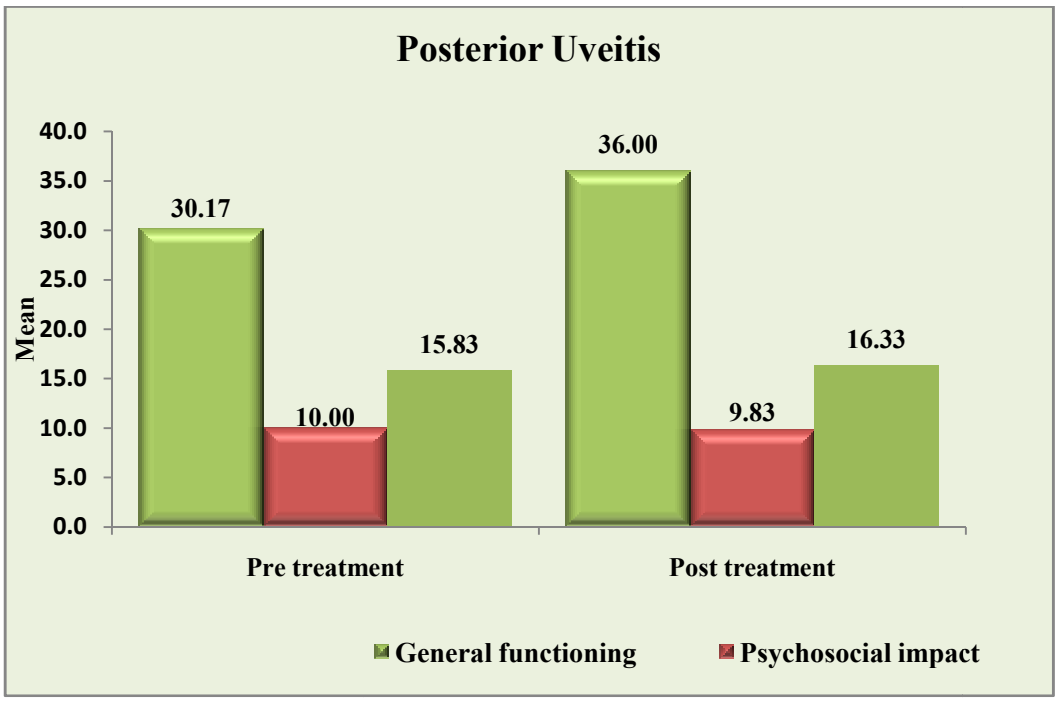
CS	Eye					
	Affected eye		Unaffected eye		Both eye	
	Mean(SD)	Min – Max	Mean (SD)	Min – Max	Mean (SD)	Min – Max
Day WOG						
1.5	1.29(0.16)	1.11 – 1.70	1.74(0.10)	1.40 – 1.85	1.37(0.17)	1.11 – 1.70
3	1.46(0.20)	1.18 – 2.06	2.01(0.10)	1.60 – 2.06	1.56(0.19)	1.18 – 1.90
6	1.47(0.21)	1.20 – 2.11	1.99(0.12)	1.65 – 2.11	1.55(0.19)	1.20 – 1.81
12	1.29(0.21)	1.04 – 1.78	1.80(0.12)	1.48 – 1.93	1.37(0.18)	1.04 – 1.78
18	0.94(0.36)	0 – 1.52	1.52(0.11)	1.23 – 1.66	1.02(0.31)	0 – 1.52
Day WG						
1.5	1.23(0.20)	0.95 – 1.70	1.74(0.10)	1.40 – 1.85	1.33(0.20)	0.95 – 1.70
3	1.39(0.22)	1.00 – 2.06	2.01(0.10)	1.60 – 2.06	1.52(0.21)	1.00 – 1.90
6	1.42(0.23)	1.08 – 2.11	1.99(0.13)	1.65 – 2.11	1.50(0.21)	1.08 – 1.81
12	1.09(0.44)	0 – 1.78	1.81(0.12)	1.48 – 1.93	1.24(0.39)	0 – 1.78
18	0.83(0.43)	0 – 1.52	1.52(0.11)	1.23 – 1.66	0.95(0.33)	0 – 1.52
Night WOG						
1.5	1.12(0.30)	0 – 1.7	1.74(0.12)	1.26 – 1.85	1.27(0.21)	0.85 – 1.56
3	1.25(0.33)	0 – 2.06	2.00(0.13)	1.46 – 2.06	1.60(0.77)	1 – 4.6
6	1.18(0.49)	0 – 2.11	1.99(0.14)	1.52 – 2.11	1.33(0.47)	0 – 1.81
12	0.81(0.60)	0 – 1.78	1.80(0.14)	1.34 – 1.93	1.08(0.51)	0 – 1.63
18	0.64(0.49)	0 – 1.52	1.52(0.13)	1.08 – 1.66	0.86(0.42)	0 – 1.36
Night WG						
1.5	0.98(0.43)	0 – 1.7	1.74(0.12)	1.26 – 1.85	1.13(0.45)	0– 1.56
3	1.00(0.52)	0 – 2.06	2.00(0.15)	1.30 – 2.06	1.35(0.97)	0 – 4.60
6	0.85(0.67)	0 – 2.11	1.98(0.16)	1.36 – 2.11	1.13(0.63)	0 – 1.81
12	0.51(0.63)	0 – 1.78	1.77(0.17)	1.18 – 1.93	0.89(0.58)	0 – 1.63
18	0.38(0.51)	0 – 1.52	1.49(0.16)	0.90 – 1.66	0.66(0.48)	0 – 1.36



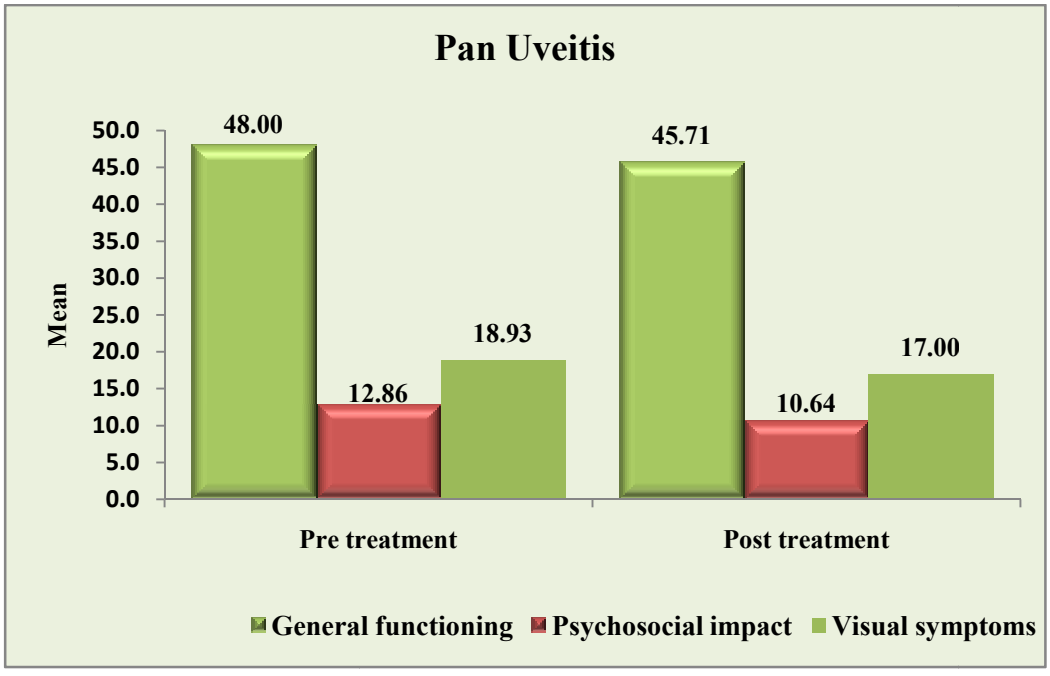
Quality of life in Anterior Uveitis



Quality of life in Intermediate Uveitis



Quality of life in Posterior Uveitis



Quality of life in Pan Uveitis

Quality of life is assessed for individual types of uveitis based on anatomical location .it is assessed for three different types of scale such as general functioning,Psychosocial impact and visual symptoms.

The assessment showed that patient with anterior uveitis showed better improvement in quality of life post treatment.

Intermediate uveitis also showed improvement in quality of life post treatment.

Quality of life is drastically affected in patient with posterior and Panuveitis.

Overall assessment showed that quality of life improved in patients with uveitis post treatment.it shows that treatment has effect on quality of life. So, the patient should be adequately treated not only to reduce the progression of disease but also to relieve the stress, visual disability and its impact on day to day life.

Quality of life assessment based on Anatomical location

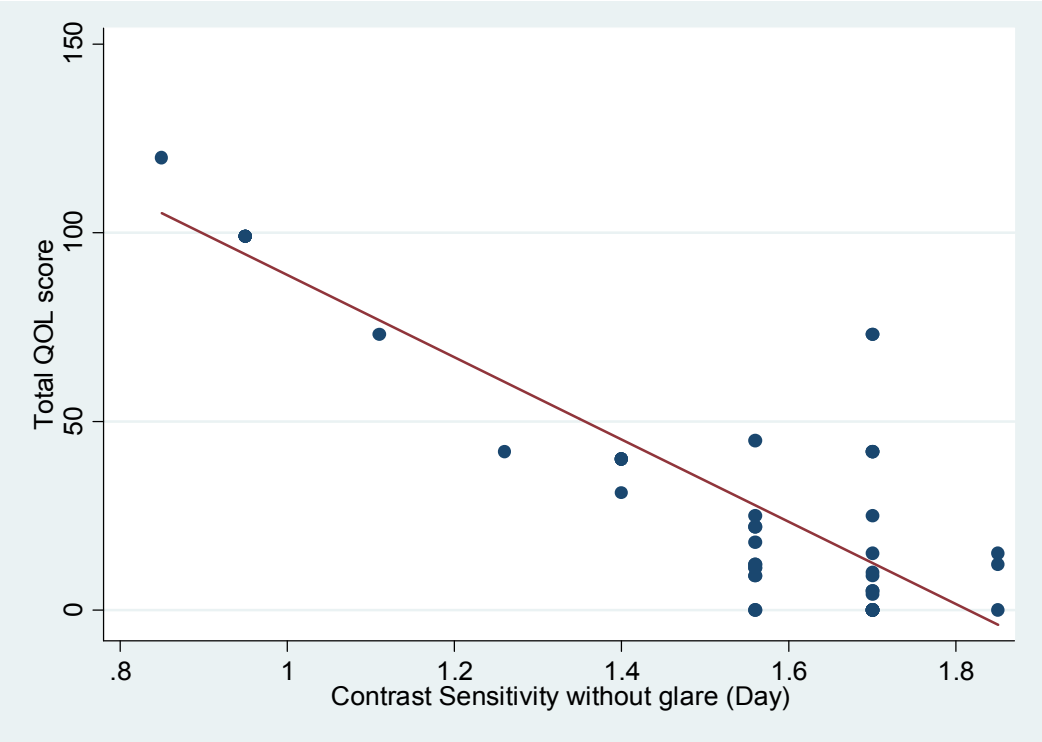
Anatomical location	Quality of life assessment				P-value
	Pre treatment		Post treatment		
	Mean(SD)	*Min – Max*	*Mean(SD)*	*Min – Max*	
Anterior uveitis					
General functioning	22.29(11.18)	8 – 41	3.86(9.99)	0 – 38	0.0014
Psychosocial impact	8.14(3.35)	4 – 15	1.50(3.67)	0 – 14	0.0014
Visual symptoms	14.21(2.64)	11 – 20	4.43(5.63)	0 – 21	0.0024
Intermediate uveitis					
General functioning	31.00(12.54)	15 – 44	8.63(8.55)	0 – 21	0.011
Psychosocial impact	10.50(3.78)	6 – 14	3.38(2.62)	0 – 6	0.011
Visual symptoms	17.38(3.89)	13 – 21	6.75(4.92)	0 – 13	0.011
Posterior uveitis					
General functioning	30.17(6.65)	22 – 42	36.00(30.56)	0 – 63	0.599
Psychosocial impact	10.00(2.28)	7 – 14	9.83(5.88)	2 – 15	0.999
Visual symptoms	15.83(2.99)	14 – 21	16.33(5.71)	7 – 21	0.739
Pan uveitis					
General functioning	48.00(10.57)	30 – 63	45.71(24.71)	8 – 84	0.612
Psychosocial impact	12.86(2.28)	10 – 15	10.64(5.34)	3 – 15	0.216
Visual symptoms	18.93(3.25)	14 – 21	17.00(5.29)	7 – 21	0.379
Total					
General functioning	31.78(14.45)	1 – 63	22.20(25.27)	0 – 84	0.0014
Psychosocial impact	10.31(3.58)	1 – 15	6.13(5.88)	0 - 15	<0.001
Visual symptoms	16.35(3.98)	4 – 21	10.98(7.67)	0 – 21	0.0001

Correlation between Visual acuity,Contrast sensitivity and Quality of life

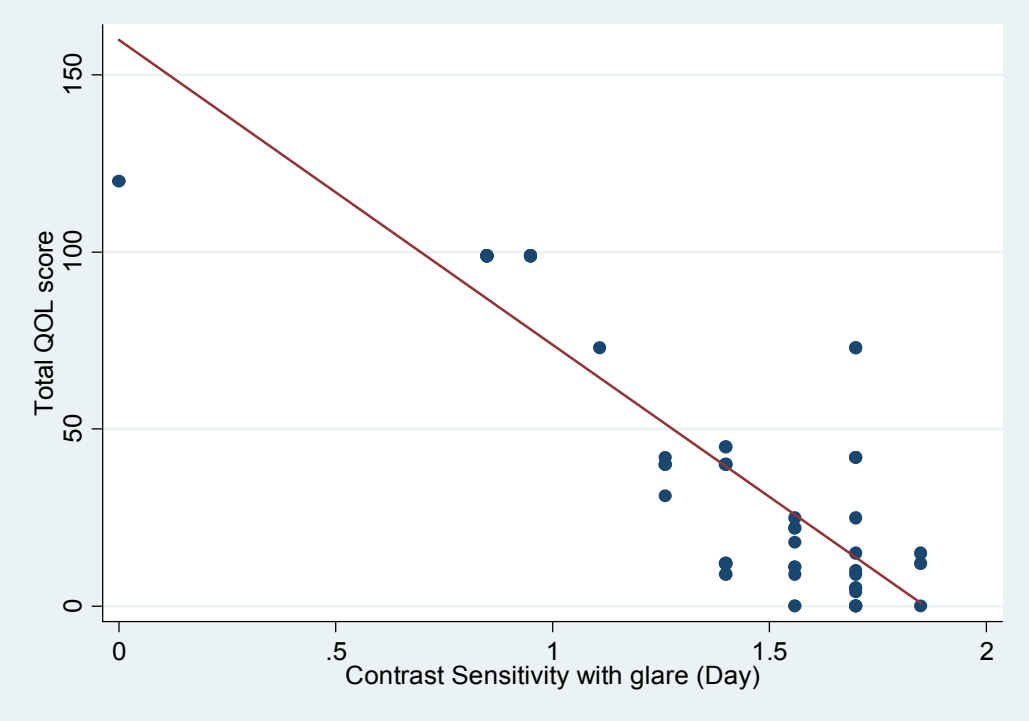
Variable	Correlation coefficient	P-value
CS Day WOG with QOL	-0.88	<0.001
CS Day WG with QOL	-0.85	<0.001
CS Night WOG with QOL	-0.85	<0.001
CS Night WG with QOL	-0.88	<0.001
BCVA with QOL	0.78	<0.001
BCVA with CS	-0.91	<0.001

There is a close correlation between the visual acuity and Contrast Sensitivity and also there is a high correlation between the visual acuity and Quality of life.

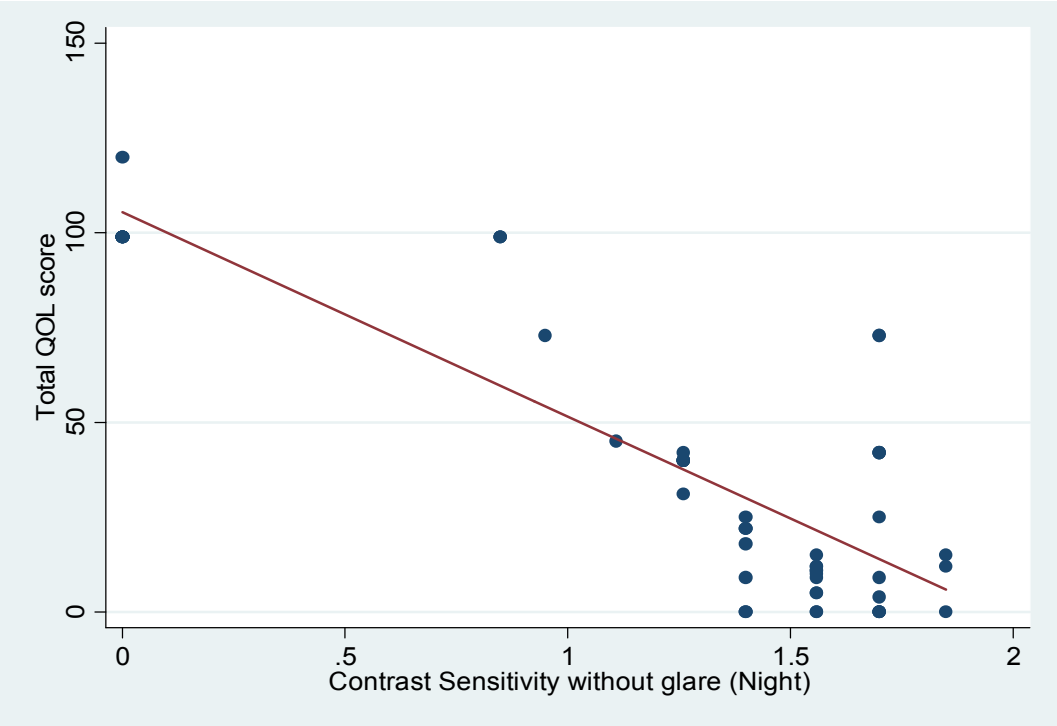
There is a negative correlation (but significant) between the Quality of life and Contrast Sensitivity of Day and Night time under conditions of without glare and with glare



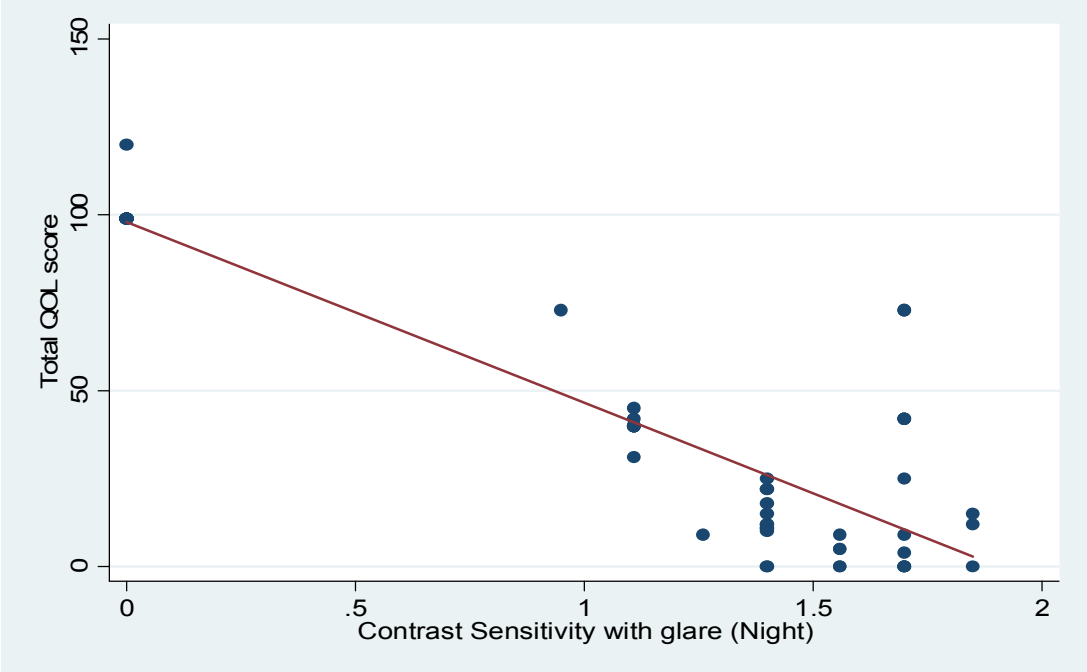
Correlation between Contrast sensitivity(Day) with out glare and QOL



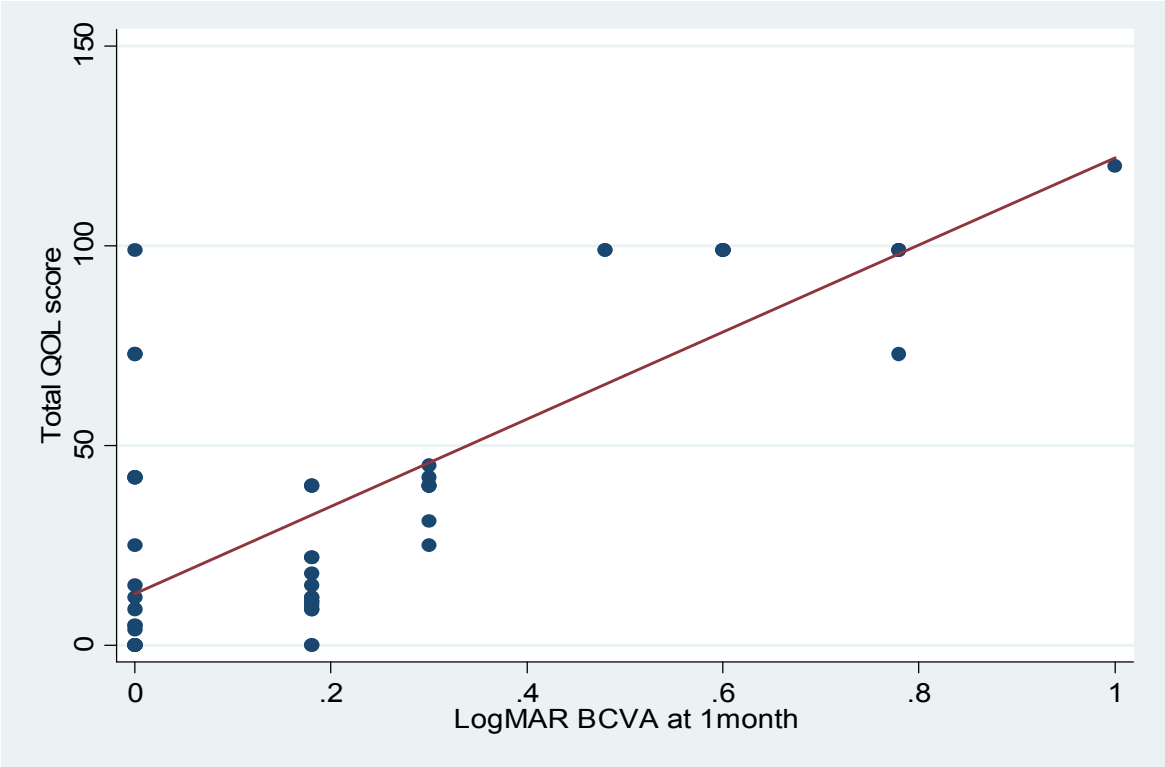
Correlation between Contrast sensitivity(Day) with glare and QOL



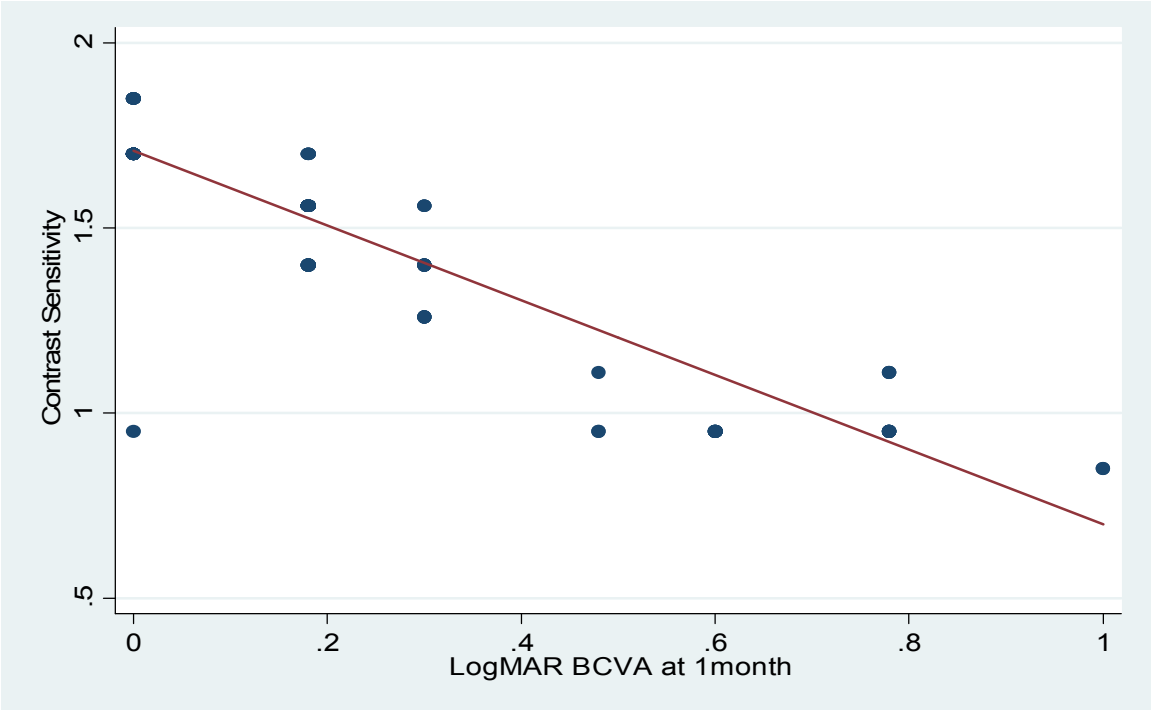
Correlation between Contrast sensitivity(Night) with out glare and QOL



Correlation between Contrast sensitivity(Night) with glare and QOL



Correlation between Visual acuity and QOL



Corelation between Visual acuity and Contrast sensitivity

DISCUSSION

Uveitis are vision threatening condition which may cause distress and disability in life,hence it is one of the cause for preventable and economic blindnes .It has a heterogenous group of different anatomical,pathological and etiological entities.

Generally in Ophthalmology,visual acuity is the only measure used to test visual function but it inadequately measure the visual performance,which may be affected by other measures which includes contrast sensitivity,colour vision,visual field examination and stereopsis.

It is that contrast sensitivity is a strong indicator of visual function. Contrast sensitivity testing determines the association between optical clarity and the minimum retinal threshold for particular pattern of the object. Therefore contrast sensitivity strongly denotes functional vision as a whole.Vision is most important of all senses.It is most of the information from the external world is appreciated through the visual system.

In Ophthalmology, the Quality of life and visual functions has been assessed with visual function assessment questionnaires for many diseases like Cataract,Age related macular degeneration,Glaucoma,Low vision patients etc.,.But still less studies were conducted in uveitis,and hence it was decided to analyse " visual function and the quality of life in Uveitic Patients" and to verify the effect of treatment in the same population and to

correlate with the contrast sensitivity in day and night vision with and without glare.

Hence,it will assess the patients subjective feeling of the disease process than the clinicial findings assessed by the doctors.

It is the first of its kind of study to assess contrast sensitivity in uveitis patients in day and night situations under the conditions of without glare and glare.

In this study 54 patients were enrolled.

No eligible patients were refused.

No selection citeria other than inclusion/exclusion criteria were used.

All the patients were advised to come for review after one month.

All the patients were adequately treated according to the condition

All the assessment was mainly based on the anatomical location of the uveitis as Anterior uveitis,Intermediate Uveitis,Posterior uveitis and Pan uveitis.

The demographic values,clinical parameters,visual function values and different scales of quality of life were assessed pre and post treatment.

The normal eyes were also assessed for visual acuity and contrast sensivity.it is done to compare values with affected eyes and also assess the binocular values and its effect on different scales of visual function questionnaire

Demographic values:

In this study, a total of 54 patients were included.

Regarding demographic values,Mean age of presentation of disease was 32 years with the range between 16 and 48 years.

Males and females were almost equally affected.

Right eye was most commonly involved than left eye.

It was unilaterally involved in 51.8% patients and bilateral in 48.2% patients.

Among 108 eyes of 54 patients,pan uveitis was most commonly affected followed by anterior,intermediate and posterior uveitis.

Most of the patient received topical corticosteroids followed by systemic corticosteroids,combined topical and systemic corticosteroids,anti-microbials and immunosuppressants.

Effect on visual acuity:

The patient affected with anterior uveitis(P value-0.0051) and Intermediate uveitis (P value 0.0002) showed significant improvement in visual acuity post treatment.there is no significant improvement in visual acuity in patients with Posterior uveitis(P value-0.11) post treatment.visual acuity is mostly reduced in Pan uveitis.There is no significant improvement (P value-0.5833) in visual acuity in patient with pan uveitis.

Overall the patients with uveitis showed significant improvement in visual acity post treatment(P value-0.0001).This shows that treatment has effect on visual acuity improvement.so,all patients with different types of uveitis should be adequately treated according to the course.

Effect on Contrast sensitivity:

Assessment in affected eyes:

Day time with out glare:

The overall assessment of contrast sensitivity in day time situations with out glare with log contrast values showed that there is significant improvement in spatial frequencies of 1.5,3,6 cpd post treatment but there is no significant improvement in contrast sensitivity at higher spatial frequencies such as 12 and 18 cpd

Day time with glare:

The overall assessment of contrast sensitivity in day time situations with glare with log contrast values showed that there is no significant improvement in contrast sensitivity at all spatial frequencies.

In this condition contrast sensitivity at higher spatial frequencies such as 12 and 18 are highly affected.

Night time with out glare:

The overall assessment of contrast sensitivity in night time situations without glare with log contrast values showed that contrast sensitivity is highly affected at 1.5,3,and 6 cpd spatial frequencies but less affected at higher spatial frequencies(12 and 18 cpd)

Night time with glare:

The overall assessment of contrast sensitivity in night time situations without glare with log contrast values showed that contrast sensitivity is highly affected at1.5 and 3 cpd spatial frequencies but less affected at 6,12 and 18 cpd spatial frequencies.

So,contrast sensitivity in affected eyes showed that it is reduced in day light with glare and night with and without glare in 1.5,3 and 6 cpd spatial frequencies. Higher spatial frequencies such as 12 and 18 cpd are least affected in night situations.

Overall contrast sensitivity is reduced in patients with uveitis but gradually improves with treatment.

Contrast sensitivity in both eyes:

The binocular assessment of contrast sensitivity showed that contrast sensitivity is reduced in all conditions such as day and night time with and without glare.

There is no significant improvement in contrast sensitivity post treatment.

It shows that uveitis affects contrast sensitivity in patients.inspite of adequate treatment ,binocular contrast sensitivity is reduced in compare with contrast sensitivity assessment with affected eyes.

Based on Anatomical location of Uveitis:

Contrast sensitivity assessed on the basis of anatomical location of uveitis showed that contrast sensitivity in all spatial frequencies in both day and light situations with and without glare showed improvement post treatment in both Anterior and Intermediate uveitis.

In posterior uveitis,contrast sensitivity is slightly improved in day time conditions with and with out glare but no significant improvement in night situations.

Contrast sensitivity is drastically affected in patients with Panuveitis in all situations in comparision to other uveitis.

Contrast sensitivity in comparison with normal eyes:

Contrast assessed in affected eyes is compared with normal eyes showed that contrast sensitivity is reduced from normal values in patients with uveitis.

Quality of life assessment :

Bases on Anatomical location of uveitis:

Quality of life is assessed for individual types of uveitis based on anatomical location .It is assessed for three different types of scale such as general functioning,Psychosocial impact and visual symptoms.

The assessment showed that patient with anterior uveitis showed better improvement in quality of life post treatment.

Intermediate uveitis also showed improvement in quality of life post treatment.

Quality of life is drastically affected in patient with posterior and Panuveitis.

Overall assessment showed that quality of life improved in patients with uveitis post treatment.It shows that treatment has effect on quality of life.So,the patient should be adequately treated not only to reduce the progression of disease but also to relieve the stress,visual diability and its impact on day to day life.

Correlation of visual function with quality of life:

The correlation of visual function such as visual acuity and contrast sensitivity in day and night situations with and without glare with quality of life assessment showed that there is a high correlation with visual acuity and contrast sensitivity.($p<0.001$) ,high correlation with visual acuity and quality

of life($p<0.001$).There is also high correlation of quality of life with contrast sensitivity in day and night situations with and without glare.($p<0.001$)

Hence,both visual acuity a and contrast sensivity can be used to assess the quality of life but visual acuity by snellen's will measure only at high contrast.Contrast sensitivity with FACT under day and light conditions with and without glare is used to assess the patient subjective observation in real life situations.

Patients with complications such as cataract,cystoid macular edema,epiretinal membrane and others drastically affected the visual function and quality of life.

It is the first of its kind that this study is conducted.There is no basic comparision for this study.

But visual function and quality of life has assessed in uveitis in general ,in intermediate uveitis,Juvenile rheumatoid arthritis associated uveitis and toxoplasmosis.

Each study used different parameters and different parameters and questionnaire to assess the visual function and quality of life

Granier et al[75]concluded that Binocular contrast sensitivity is the best measure to measure the visual function in uveitis patients in real situations.the young patients with poor binocular visual acuity had worst quality of life.

In contrast to this study our study showed that Both visual acuity and contrast sensitivity can be used to assess quality of life in uveitis patients.

Rhelt M et al[72] revealed that uveitis affects the visual functioning and general health of the patients.More severe the disease more pronounced is the fall in visual functioning scores.

Our study also showed the similar results that uveitis affects the visual function and quality of life at presentation but improves after treatment

C C Murphy et al[76] concluded that majority of patients with Intermediate Uveitis maintain good visual function and quality of life.Impaired VR-QOL and HR-QOL correlates with worse eye with Intermediate Uveitis

In our study,visual acuity and quality of life improved after treatment but there is no significant improvement in contrast sensitivity post treatment.

Janine Scherrer et al[78] in their study in ocular toxoplasmosis showed that Standard automated perimetry may better reflect the functional damage than visual acuity"

In our study,visual field is not analysed.

Aravind Venkatraman et al[79] showed that visual function scores improved significantly in patients with uveitis post treatment and there is a correlation to visual acuity thus illustrates that VR-QOL is effective in assessing the effectiveness of treatment.

Our study showed that there is a strong correlation between visual acuity, contrast sensitivity and quality of life.both visual function and quality of life improves with treatment.

CONCLUSION

It is concluded that

The patients with uveitis showed significant improvement in visual acuity post treatment.This shows that treatment has effect on visual acuity improvement.hence,all patients with different types of uveitis should be adequately treated according to the course.

Contrast sensitivity is drastically reduced in patients with Panuveitis and also in posterior uveitis.Anterior and Intermediate uveitis showed better improvement in contrast sensitivity post treatment. Overall Contrast sensitivity is reduced in patients with uveitis but gradually improves with treatment

Patient with Anterior uveitis showed better improvement in quality of life post treatment. Intermediate uveitis also showed improvement in quality of life post treatment. Quality of life is drastically affected in patient with posterior and Panuveitis

There is high correlation between visual acuity with contrast sensitivity in day and night situations with and with out glare and then with quality of life

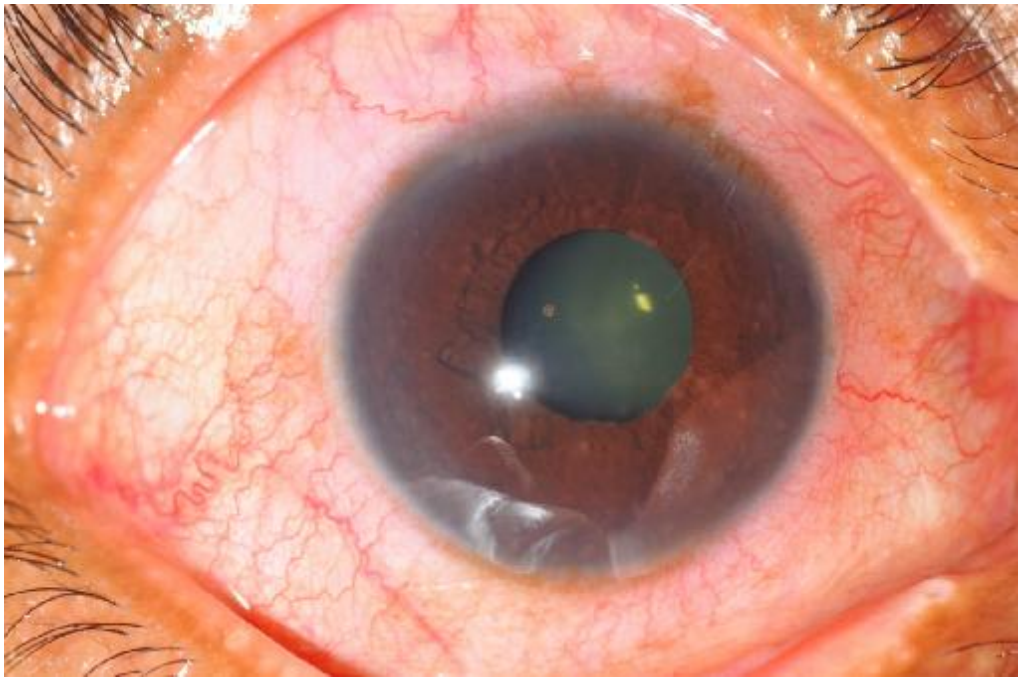
Hence, both Visual acuity and Contrast sensitivity can be used to assess the Quality of life but contrast sensitivity will show subject observation in real time situations.

LIMITATIONS

The limitations of this study are

- It is not done in pediatric population since questionnaire was designed for adult population.
- Patient with poor visual acuity i.e., who are not able to read letters in snellen chart are not included for the ease of stastical analysis.
- The study can be extended by longterm follow up to understand the real visual sequalae

Stereo Optical OPTEC 6500 P Functional Visual Analyser

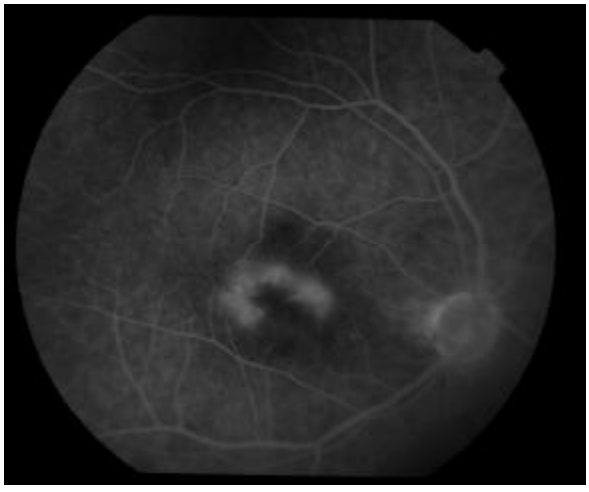


ANTERIOR UVEITIS

VITREOUS EXUDATES

PAPILLITIS

CYSTOID MACULAR EDEMA



FFA SHOWING LEAKAGE IN LATE PHASE IN CYSTOID MACULAR EDEMA

BIBLIOGRAPHY

1. Basics and clinical science course: AAO, 2012-2013:p 103-121
2. Owsley C, Sloane ME. Contrast sensitivity, acuity, and the perception of “real-world” targets. Br J Ophthalmol. 1987 Oct;71(10):791–6.
3. Owsley C, Stalvey BT, Wells J, Sloane ME, McGwin G. Visual risk factors for crash involvement in older drivers with cataract. Arch Ophthalmol. 2001 Jun;119(6):881–7.
4. Campbell FW, Green DG. Optical and retinal factors affecting visual resolution. J Physiol (Lond). 1965 Dec;181(3):576–93.
5. Schwiegerling J. Theoretical limits to visual performance. Surv Ophthalmol. 2000 Oct;45(2):139–46.
6. Kniestedt C, Stamper RL. Visual acuity and its measurement. Ophthalmol Clin North Am. 2003 Jun;16(2):155–70, v.
7. Slevin ML, Plant H, Lynch D, Drinkwater J, Gregory WM. Who should measure quality of life, the doctor or the patient? Br J Cancer. 1988 Jan;57(1):109–12.
8. Fitzpatrick R, Fletcher A, Gore S, Jones D, Spiegelhalter D, Cox D. Quality of life measures in health care. I: Applications and issues in assessment. BMJ. 1992 Oct 31;305(6861):1074–7.
9. Bergner M, Bobbitt RA, Carter WB, Gilson BS. The Sickness Impact Profile: development and final revision of a health status measure. Med

Care. 1981 Aug;19(8):787–805.

10. Granger CV, Hamilton BB. The Uniform Data System for Medical Rehabilitation report of first admissions for 1991. Am J Phys Med Rehabil. 1993 Feb;72(1):33–8.

11. Pfeffer RI, Kurosaki TT, Harrah CH, Chance JM, Filos S. Measurement of functional activities in older adults in the community. J Gerontol. 1982 May;37(3):323–9.

12. Sommer A. Use of quality-of-life instruments in randomized clinical trials. Arch Ophthalmol. 1997 Apr;115(4):564–5.

13. Massof RW, Hsu CT, Baker FH, Barnett GD, Park WL, Deremeik JT, et al. Visual disability variables. II: The difficulty of tasks for a sample of low-vision patients. Arch Phys Med Rehabil. 2005 May;86(5):954–67.

14. Brown GC, Brown MM, Sharma S. Difference between ophthalmologists' and patients' perceptions of quality of life associated with age-related macular degeneration. Can J Ophthalmol. 2000 Apr;35(3):127–33.

15. Lee BL, Wilson MR. Health-related quality of life in patients with cataract and glaucoma. J Glaucoma. 2000 Feb;9(1):87–94.

16. Ellwein LB. Quality of life outcome measures: issues in low Vision Rehabilitation: New York Press, 2001:143-158.

17. Fletcher A, Vijaykumar V, Selvaraj S, Thulasiraj RD, Ellwein LB. The

Madurai Intraocular Lens Study. III: Visual functioning and quality of life outcomes. Am J Ophthalmol. 1998 Jan;125(1):26–35.

18. Natchiar GN, Thulasiraj RD, Negrel AD, Bangdiwala S, Rahmathallah R, Prajna NV, et al. The Madurai Intraocular Lens Study. I: A randomized clinical trial comparing complications and vision outcomes of intracapsular cataract extraction and extracapsular cataract extraction with posterior chamber intraocular lens. Am J Ophthalmol. 1998 Jan;125(1):1–13.
19. Nagpal R, Sell H. Subjective well-being: SEARO Regional health papers No. 7, New Delhi: World Health Organization, 1985.
20. Rathinam SR, Babu M. Algorithmic approach in the diagnosis of uveitis. Indian J Ophthalmol. 2013 Jun;61(6):255–62.
21. Kanski JJ, Bowling B. Clinical Ophthalmology: A Systematic Approach. 7th Ed. Elsevier Health Sciences; 2011, p. 402-407.
22. Intraocular Inflammation and Uveitis, American Academy of Ophthalmology; 2012-2013;p 75-313
23. Jabs DA, Nussenblatt RB, Rosenbaum JT, Standardization of Uveitis Nomenclature (SUN) Working Group. Standardization of uveitis nomenclature for reporting clinical data. Results of the First International Workshop. Am J Ophthalmol. 2005 Sep;140(3):509–16.
24. Bloch-Michel E, Nussenblatt RB. International Uveitis Study Group recommendations for the evaluation of intraocular inflammatory

disease. Am J Ophthalmol. 1987 Feb 15;103(2):234–5.

25. Guly CM, Forrester JV. Investigation and management of uveitis. BMJ. 2010;341:c4976.

26. Smith RE, Nozik RA. Uveitis: A Clinical Approach to Diagnosis and Management. Williams & Wilkins; 1989.

27. Nussenblatt RB. Uveitis: Fundamentals and Clinical Practice. Mosby; 1996. p.58-68 .

28. Majumder PD, Sudharshan S, Biswas J. Laboratory support in the diagnosis of uveitis. Indian J Ophthalmol. 2013 Jun;61(6):269–76.

29. Gupta V, Gupta A. Ancillary investigations in uveitis. Indian J Ophthalmol. 2013 Jun;61(6):263–8.

30. Babu K, Mahendradas P. Medical management of uveitis - current trends. Indian J Ophthalmol. 2013 Jun;61(6):277–83.

31. Murthy SI, Pappuru RR, Latha KM, Kamat S, Sangwan VS. Surgical management in patient with uveitis. Indian J Ophthalmol. 2013 Jun;61(6):284–90.

32. Foster CS, Rashid S. Management of coincident cataract and uveitis. Curr Opin Ophthalmol. 2003 Feb;14(1):1–6.

33. Khurana AK, Khurana I. Anatomy & Physiology of Eye, 2e (HB). Corporate Brochure Company; 2008, p.169-270.

34. Khurana AK. Theory and Practice of Optics and Refraction. Elsevier

India; 2008, p.39-60.

35. Schade OH. Optical and photoelectric analog of the eye. J Opt Soc Am. 1956 Sep;46(9):721–39.

36. Arundale K. An investigation in to variation of contrast sensitivity with age and ocular pathology. Br J Ophthalmology 1978; 62:213-215.

37. Arden GB, Jacobson JJ. A simple grating test for contrast sensitivity: preliminary results indicate value in screening for glaucoma. Invest Ophthalmol Vis Sci. 1978 Jan;17(1):23–32.

38. Howe JW, Mitchell KW, Mahabaleswara M, Abdel-Khalek MN. Visual evoked potential latency and contrast sensitivity in patients with posterior chamber intraocular lens implants. Br J Ophthalmol. 1986 Dec;70(12):890–4.

39. Bodis-Wollner I. Visual acuity and contrast sensitivity in patients with cerebral lesions. Science. 1972 Nov 17;178(4062):769–71.

40. Regan D, Neima D. Low-contrast letter charts as a test of visual function. Ophthalmology. 1983 Oct;90(10):1192–200.

41. Arden GB. Testing contrast sensitivity in clinical practice. Clin Vis Sci. 1988;2(3):213–224

42. Pelli DG, Robson JG, Wilkin AJ. The design of a new letter chart for measuring contrast sensitivity. Clin Vis Sci. 1988;2(3):187-199.

43. Campbell FW, Robson JG. Application of Fourier analysis to the visibility of gratings. J Physiol (Lond). 1968 Aug;197(3):551–66.

44. Michael, CR. Colour vision N Eng J Med, 288:724, 1973
45. Skalka HW. Effect of age on Arden grating acuity. Br J Ophthalmol. 1980 Jan;64(1):21–3.
46. Lempert P, Hopcroft M, Lempert Y. Evaluation of posterior subcapsular cataracts. With spatial contrast acuity. Ophthalmology. 1987 Aug;Pt 2:14–8.
47. Arundale K. An investigation into the variation of human contrast sensitivity with age and ocular pathology. Br J Ophthalmol. 1978 Apr;62(4):213–5.
48. Young T. On the theory of light and colours. Philos Trans R Soc Lond Biol Sci. 1802;92:12-48.
49. De Valois RL., Abramov I, Colour Vision. Am Revphysiol 17:337-362, 1966.
50. Rushton WA. A Cone Pigment in the Protanope. J Physiol (Lond). 1963 Sep;168:345–59
51. Rushton WA. A Foveal Pigment in the Deuteranope. J Physiol (Lond). 1965 Jan;176:24–37.
52. Aguilar M, Stiles WS. Saturation of the Rod Mechanism of the Retina at High Levels of Stimulation. Optica Acta: International Journal of Optics. 1954 Jan 1;1(1):59–65.
53. Mandelbaum J. Dark adaptation: Some physiologic and clinical

considerations. Arch Ophthalmol. 1941 Aug 1;26(2):203–39.

54. Rushton WA. Rhodopsin measurement and dark-adaptation in a subject deficient in cone vision. J Physiol (Lond). 1961 Apr;156:193–205.

55. Ripps H. Night blindness and the retinal mechanism of visual adaptation. Ann R Coll Surg Engl. 1976 May;58(3):222–32.

56. Hecht S, Haig C, Chase AM. The Influence of Light Adaptation on Subsequent Dark Adaptation of the Eye. J Gen Physiol. 1937 Jul 20;20(6):831–50.

57. Wald G, Clark AB. Visual Adaptation and Chemistry of the Rods. J Gen Physiol. 1937 Sep 20;21(1):93–105.

58. Hecht S, Haig C, Wald G. The Dark Adaptation of Retinal Fields of Different Size and Location. J Gen Physiol. 1935 Nov 20;19(2):321–37.

59. Klingaman RL. The human visual evoked cortical potential and dark adaptation. Vision Res. 1976;16(12):1471–7.

60. Barlow HB, Fitzhugh R, Kuffler SW. Change of organization in the receptive fields of the cat's retina during dark adaptation. J Physiol (Lond). 1957 Aug 6;137(3):338–54.

61. Rushton WA. Dark-adaptation and the regeneration of rhodopsin. J Physiol (Lond). 1961 Apr;156:166–78.

62. Wachler BS, Krueger RR. Normalized contrast sensitivity values. J Refract Surg. 1998 Aug;14(4):463–6.
63. Montés-Micó R, Ferrer-Blasco T. Contrast sensitivity function in children: normalized notation for the assessment and diagnosis of diseases. Doc Ophthalmol. 2001 Nov;103(3):175–86.
64. Gupta SK, Viswanath K, Thulasiraj RD, Murthy GVS, Lamping DL, Smith SC, et al. The development of the Indian vision function questionnaire: field testing and psychometric evaluation. Br J Ophthalmol. 2005 May;89(5):621–7.
65. Murthy GVS, Gupta SK, Thulasiraj RD, Viswanath K, Donoghue EM, Fletcher AE. The development of the Indian vision function questionnaire: questionnaire content. Br J Ophthalmol. 2005 Apr;89(4):498–503.
66. Rovner BW, Casten RJ, Tasman WS. Effect of depression on vision function in age-related macular degeneration. Arch Ophthalmol. 2002 Aug;120(8):1041–4.
67. Gothwal VK, Wright TA, Lamoureux EL, Pesudovs K. Cataract Symptom Scale: clarifying measurement. Br J Ophthalmol. 2009 Dec;93(12):1652–6.
68. Pesudovs K, Wright TA, Gothwal VK. Visual disability assessment: valid measurement of activity limitation and mobility in cataract

patients. Br J Ophthalmol. 2010 Jun;94(6):777–81.

69. Massof RW, Rubin GS. Visual function assessment questionnaires. Surv Ophthalmol. 2001 Jun;45(6):531–48.

70. Marella M, Gothwal VK, Pesudovs K, Lamoureux E. Validation of the visual disability questionnaire (VDQ) in India. Optom Vis Sci. 2009 Jul;86(7):E826–35.

71. Mayer. L., Fulton. A., and Rodier. D.: Grating and Opthalmology 91:947, 1984

72. Schiffman RM, Jacobsen G, Whitcup SM. Visual functioning and general health status in patients with uveitis. Arch Ophthalmol. 2001 Jun;119(6):841–9.

73. Lee BL, Wilson MR. Health-related quality of life in patients with cataract and glaucoma. J Glaucoma. 2000 Feb;9(1):87–94.

74. Brown GC, Brown MM, Sharma S. Difference between ophthalmologists' and patients' perceptions of quality of life associated with age-related macular degeneration. Can J Ophthalmol. 2000 Apr;35(3):127–33.

75. Gardiner AM, Armstrong RA, Dunne MC, Murray PL. Correlation between visual function and visual ability in patients with uveitis. Br J Ophthalmol. 2002;86:993–6.

76. Murphy CC, Hughes EH, Frost NA, Dick AD. Quality of life and visual function in patients with intermediate uveitis. Br J Ophthalmol.

2005 Sep;89(9):1161–5.

77. Angeles-Han ST, Griffin KW, Lehman TJA, Rutledge JR, Lyman S, Nguyen JT, et al. The importance of visual function in the quality of life of children with uveitis. J AAPOS. 2010 Apr;14(2):163–8.

78. Scherrer J, Iliev ME, Halberstadt M, Kodjikian L, Garweg JG. Visual function in human ocular toxoplasmosis. Br J Ophthalmol. 2007 Feb;91(2):233–6.

79. Venkataraman A, Rathinam SR. A pre- and post-treatment evaluation of vision-related quality of life in uveitis. Indian J Ophthalmol. 2008 Aug;56(4):307–12.

80. Rothova A, Suttorp-van Schulten MS, Frits Treffers W, Kijlstra A. Causes and frequency of blindness in patients with intraocular inflammatory disease. Br J Ophthalmol. 1996 Apr;80(4):332–6.

81. Vadot E, Barth E, Billet P. Epidemiology of uveitis—preliminary results of a prospective study in Savoy. In: Saari KM, ed. Uveitis update. Amsterdam: Elsevier; 1984:13–16.

82. Department of Health and Social Security. Causes of Blindness and Partial Sight among adults in 1976/77, and 1980/81. London: HMSO, 1988.

83. BenEzra D, Forrester JV, Nussenblatt RB, et al. Uveitis scoring

system. Berlin: Springer, 1991, p.1-13.

84. Legro MW. Quality of life and cataracts: a review of patient-centered studies of cataract surgery outcomes. Ophthalmic Surg. 1991 Aug;22(8):431–43.

85. Parrish RK, Gedde SJ, Scott IU, Feuer WJ, Schiffman JC, Mangione CM, et al. Visual function and quality of life among patients with glaucoma. Arch Ophthalmol. 1997 Nov;115(11):1447–55.

86. Montés-Micó R, Charman WN. Choice of spatial frequency for contrast sensitivity evaluation after corneal refractive surgery. J Refract Surg. 2001 Dec;17(6):646–51.

87. Montés-Micó R, Charman WN. Mesopic contrast sensitivity function after excimer laser photorefractive keratectomy. J Refract Surg. 2002 Feb;18(1):9–13.

88. Montés-Micó R, España E, Menezo JL. Mesopic contrast sensitivity function after laser in situ keratomileusis. J Refract Surg. 2003 Jun;19(3):353–6.

89. Van Nes FL, Koenderink JJ, Nas H, Bouman MA. Spatiotemporal modulation transfer in the human eye. J Opt Soc Am. 1967 Sep;57(9):1082–8.

90. Yamane N, Miyata K, Samejima T, Hiraoka T, Kiuchi T, Okamoto F, et al. Ocular higher-order aberrations and contrast sensitivity after

conventional laser in situ keratomileusis. Invest Ophthalmol Vis Sci. 2004 Nov;45(11):3986–90.

PROFORMA

(Key to Master chart)

Name :

Age : **Sex** :

MR.NO:

Mobile No :

Address :

Study Eye : RE-1; LE-2; BE-3

Anatomical location:	**RIGHT**	**LEFT**
Anterior-1		
Intermediate-2		
Posterior-3		
Panuveitis-4		

Pre-Treatment Assessment:	**RIGHT**	**LEFT**
BCVA		
NCT		

Anterior Segment findings:	**RIGHT**	**LEFT**
Scleritis		
Absent-0: Present-1		

Keratic precipitates	**RIGHT**	**LEFT**
Absent-0;present-1		
AC Cells(0,1+,2+,3+,4+)		
AC Flare (0,1+,2+,3+,4+)		
Synechiae		
Absent-0:Present-1		
Hypopyon		
Absent-0:Present-1		
Lens status		
Clear-1;lens changes-2;		
Cataract-3;Pseudophakia-4;		
Aphakia-5		
Posterior segment findings:		
Media		
clear-1;Hazy-2		
Vitreous cells		
Absent-0;Present-1		
Vitreous opacities		
Absent-0;Present-1		
Pars planitis		
Bank-1;balls-2;both-3		
Vasculitis		
Absent-0;Present-1		
Retinitis		

RIGHT **LEFT**

Absent-0:Focal-1;multifocal-2

Retinochoriditis

Absent-0:Focal-1;multifocal-2

Papillitis

Absent-0;Present-1

Vitreous Hemorrhage

Absent-0;Present-1

CME

Absent-0;Present-1

ERM

Absent-0;Present-1

CNVM

Absent-0;Present-1

Optic atrophy

Absent-0;Present-1

Treatment:

0-no treatment;

1-Topical corticosteroids,

2-systemic Corticosteroids,

3-Cycloplegics;

4-immunosuppresants,

5-others like Anti-microbials

6-Periocular steroid

Contrast Sensitivity Assessment:

Recorded in FACT recording form

The values are recorded as log contrast values

(Recording form,Log contrast values attached)

Quality of Life Assessment:

Recorded in IND VFQ-33 form

(IND VFQ-33 questionnaire attached)

It has three scales

1.General functioning questions(question 1 to 21)

2.Psychosocial questions(question 22 to 26)

3.visual symptoms questions(question 27 to 33)

The response is recorded as follows:

For **General functioning scale:**

0-Not at all

1-A little

2-Quite a bit

3-A lot

4-Cannot do this because of my sight

For **Psychosocial impact and Visual symptoms scale:**

0-Not at all

1-A little

2-Quite a bit

3-A lot

Post-treatment Assessment(1 month follow up)

Assesed same as in Pre-treatment

SPECIAL STEREO OPTICAL RECORD FORM FOR THE OPTEC VISION TESTER

NAME: _____ DATE: _____

ADDRESS: _____ AGE: _____

ADDRESS: _____ WEARING GLASSES: Y N

ADMINISTRATOR: _____ CONTACT LENSES: Y N

DIAL AT 01: *FAR ACUITY MONOCULAR*

LINE	ACUITY	LEFT	RIGHT
5	20/160	D R C H V	R V C S H
6	20/125	C K N R D	C K D Z R
7	20/100	S H Z D O	O V R H K
8	20/80	R O D V C	N R V K O
9	20/63	K R H S D	K S N D C
10	20/50	C O S Z H	V H C R D
11	20/40	Z C V O R	D S R K H
12	20/32	C R D V H	K R S N D
13	20/25	D C V H S	S Z V H O
14	20/20	K V S C R	H R C S N
15	20/16	O C N K D	Z C V N O
16	20/12.5	D K C V Z	O K Z H C

DIAL AT 02: *FAR ACUITY BINOCULAR*

LINE	ACUITY	B O T H
5	20/160	S C N Z V
6	20/125	C S H D N
7	20/100	O N K C H
8	20/80	C V Z H O
9	20/63	V C H O N
10	20/50	R D C Z K
11	20/40	H O S D R
12	20/32	R S O V H
13	20/25	N O K D R
14	20/20	Z H S O K
15	20/16	C D K V H
16	20/12.5	H K D C O

DIAL AT 03: *NEAR ACUITY MONOCULAR*

LINE	ACUITY	LEFT	RIGHT
5	20/160	R D K V C	S C N Z V
6	20/125	V O S D R	C S H D N
7	20/100	O Z C R S	O N K C H
8	20/80	C O K R N	C V Z H O
9	20/63	Z H S K O	V C H O N
10	20/50	C V D H K	R D C Z K
11	20/40	R H O D S	H O S D R
12	20/32	O N V C Z	R S O V H
13	20/25	H D R V C	N O K D R
14	20/20	K R N S D	Z H S O K
15	20/16	C Z D V K	C D K V H
16	20/12.5	H D K C N	H K D C O

DIAL AT 04: *NEAR ACUITY BINOCULAR*

LINE	ACUITY	B O T H
5	20/160	R D K V C
6	20/125	V O S D R
7	20/100	O Z C R S
8	20/80	C O K R N
9	20/63	Z H S K O
10	20/50	C V D H K
11	20/40	R H O D S
12	20/32	O N V C Z
13	20/25	H D R V C
14	20/20	K R N S D
15	20/16	C Z D V K
16	20/12.5	H D K C N

DIAL AT 05 thru 09: Functional Acuity Contrast Test
Charts on Reverse Side

DIAL AT 10: *DEPTH PERCEPTION - FAR*

	1-B	2-L	3-B	4-T	5-T	6-L	7-R	8-L	9-R
SECONDS OF ARC	400	200	100	70	50	40	30	25	20

DIAL AT 11: *COLOR PERCEPTION - FAR* A-1 2 B-5 C-2 6 D-6 E-1 6 F-BLANK

DIAL AT 12: *POTENTIAL ACUITY - FAR*

FAR ACUITY MONOCULAR

LINE	ACUITY	LEFT	RIGHT
5	20/160	D R C H V	R V C S H
6	20/125	C K N R D	C K D Z R
7	20/100	S H Z D O	O V R H K
8	20/80	R O D V C	N R V K O
9	20/63	K R H S D	K S N D C
10	20/50	C O S Z H	V H C R D
11	20/40	Z C V O R	D S R K H
12	20/32	C R D V H	K R S N D
13	20/25	D C V H S	S Z V H O
14	20/20	K V S C R	H R C S N
15	20/16	O C N K D	Z C V N O
16	20/12.5	D K C V Z	O K Z H C

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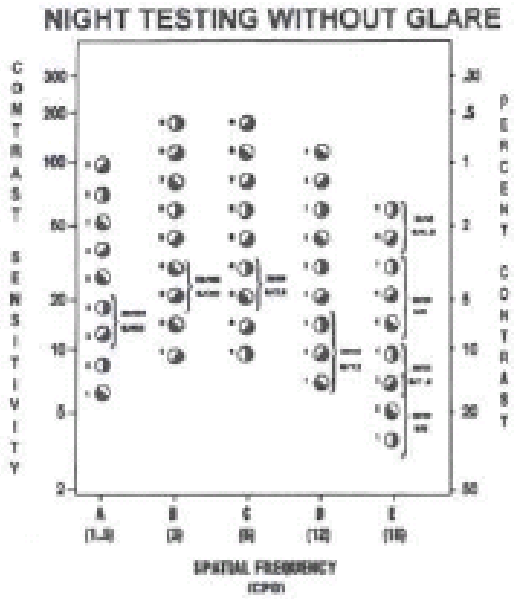
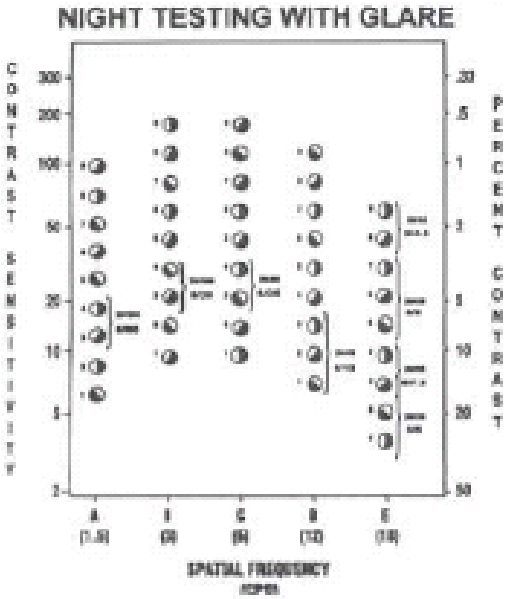
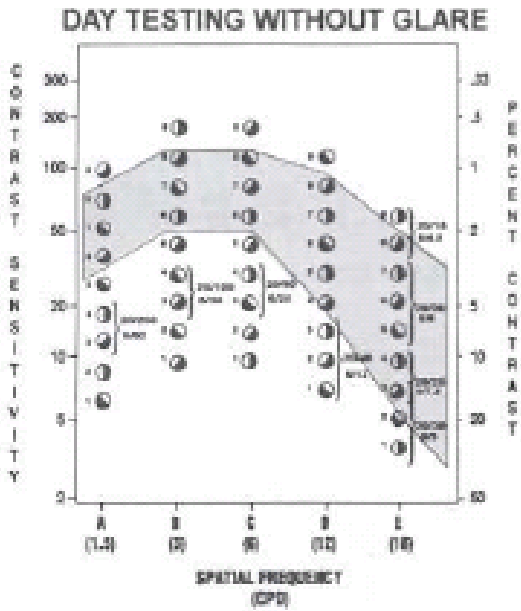
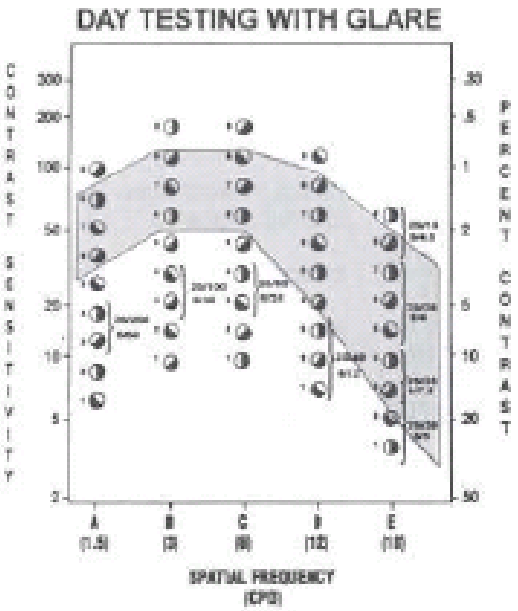

NIGHT TESTING WITHOUT GLARE
CONTRAST SENSITIVITY
PERCENT CONTRAST
SPATIAL FREQUENCY
(CPD)


NIGHT TESTING WITH GLARE
CONTRAST SENSITIVITY
PERCENT CONTRAST
SPATIAL FREQUENCY
(CPD)


DAY TESTING WITHOUT GLARE
CONTRAST SENSITIVITY
PERCENT CONTRAST
SPATIAL FREQUENCY
(CPD)


DAY TESTING WITH GLARE
CONTRAST SENSITIVITY
PERCENT CONTRAST
SPATIAL FREQUENCY
(CPD)

STEREO OPTICAL COMPANY, INC.

Functional Acuity Contrast Test®
(F.A.C.T.®)

Contrast Sensitivity Values, Norms, and Logrithmic Values

ROW	CYCLES PER DEGREE	1	2	3	4	5	6	7	8	9	LOW NORMAL	HIGH NORMAL
A	1.5	7	9	13	18	25	36	50	71	100	33	90
B	3	10	15	20	29	40	57	80	114	160	49	129
C	6	12	16	23	33	45	64	90	128	180	55	142
D	12	8	11	15	22	30	43	60	85	120	17	95
E	18	4	6	8	12	17	23	33	46	65	6	52
		LOG VALUES										
A	1.5	0.85	0.95	1.11	1.26	1.40	1.56	1.70	1.85	2.00	1.52	1.95
B	3	1.00	1.18	1.30	1.46	1.60	1.76	1.90	2.06	2.20	1.69	2.11
C	6	1.08	1.20	1.36	1.52	1.65	1.81	1.95	2.11	2.26	1.74	2.15
D	12	0.90	1.04	1.18	1.34	1.48	1.63	1.78	1.93	2.08	1.23	1.98
E	18	0.60	0.78	0.90	1.08	1.23	1.36	1.52	1.66	1.81	0.78	1.72

STEREO OPTICAL COMPANY, INC.
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E-mail: sales@stereooptical.com Website: www.stereooptical.com

Indian Visual Function Questionnaire (IND – VFQ 33)

Patient Name: _____ Age : _____ Sex : M / F

M.R.No: _____ Interview's Name : _____

In first section, I am going to ask you how much your vision problem affects you in doing your daily activities. I will read out a choice of four answers and you will choose the one you feel describes you best. If you cannot do or don't do this activity because of vision or other reasons, please tell me

S.No	Questions	Not at all	A little	Quite a bit	A lot	Cannot do this because of my sight
1	Because of your vision how much problem do you have in climbing stairs?					
2.	Because of your vision how much problem do you have in making out the bumps and holes in the road when walking?					
3.	Because of your vision how much problem do you have in seeing if there are animals or vehicles when walking?					
4.	Because of your vision how much problem do you have in finding your way in new places?					
5.	Because of your vision how much problem do you have in going to social functions such as weddings?					
6.	Because of your vision how much problem do you have in going out at night?					
7.	Because of your vision how much problem do you have in finding your way indoors?					
8.	Because of your vision how much problem do you have in seeing the steps of the bus when climbing in or out?					
9.	Because of your vision how much problem do you have in recognising people from a distance?					
10.	Because of your vision how much problem do you have in recognising the face of a person standing near you?					

S.No	Questions	Not at all	A little	Quite a bit	A lot	Cannot do this because of my sight
11.	Because of your vision how much problem do you have in locking or unlocking the door?					
12	Because of your vision how much pro blem do you have in doing your usual work either in the house or outside?					
13	Because of your vision how much problem do you have in doing your work up to your usual standard?					
14	Because of your vision how much problem do you have in searching for things at home?					
15	Because of your vision how much problem do you have in seeing outside in bright sunlight					
16	Because of your vision how much problem do you have in seeing when coming into the house after being in the sunlight?					
17	Because of your vision how much problem do you have in seeing differences in colours?					
18	Because of your vision how much problem do you have in making out differences in coins or notes?					
19	Because of your vision how much problem do you have in going to the toilet?					
20	Because of your vision how much problem do you have in seeing objects that may have fallen in the food?					
21	Because of your vision how much problem do you have in seeing the level in the container when pouring?					

In the next section ,I am going to ask you how you feel because of your eye problem ,I will red out a choice of four answers and you will choose the one you feel describes you best					
S.No	Questions	Not at all	A little	Quite a bit	A lot
22	Because of your eye problem do you feel frightened to go out at night?				
23	Because of your eye problem do you enjoy social functions less?				
24	Because of your eye problem do you ashamed that you can't see?				
25	Because of your eye problem do you feel you have become a burden on others?				
26	Because of your eye problem do you feel frightened that you may lose your remaining vision?				

In the next section, I am going to ask you to what extent do you have the following eye problems. I will read out a choice off our answers and you will choose the one you feel describes you best.					
S.No	Questions	Not at all	A little	Quite a bit	A lot
27	Do you have reduced vision?				
28	Are you dazzled in bright light?				
29	Is your vision blurred in sunlight?				
30	Does bright light hurt your eyes?				
31	Do you close your eyes because of light from vehicles?				
32	Does light seem like stars?				
33	Do you have blurred vision?				

Signature of interviewer

Date :

Place :

ABBREVIATIONS

VA	-	Visual Acuity
BCVA	-	Best Corrected Visual Acuity
CS	-	Contrast Sensitivity
Log MAR	-	Logarithmic Minimum Angle Resolution
Log CS	-	Logarithmic Contrast Sensitivity
FACT	-	Functional Acuity Contrast Test
cpd	-	cycles per degree
WOG	-	With out Glare
WG	-	With Glare
QOL	-	Quality Of Life
VR-QOL	-	Vision Related Quality Of Life
IND-VFQ33	-	Indian Visual Function Questionnaire 33
SUN	-	Standardisation of Uveitis Nomenclature

S.No	MR No.	Name	Age	Sex	Study Eye	Anatomical Location	BCVA	NCT	Anterior Segment							Posterior Segment												Treatment	Contrast S									
																													CS (Day)									
																													Without glare					With glare				
									Scleritis	Kps	AC cells	AC flare	Synaechiae	Hypopyon	Lens status	Media	Vitreous cells	Vitreous opacities	Pars plana exudates	Vasculitis	Retinitis	Retinochoroditis	Papillitis	VH	CME	ERM	CNVM	Optic atrophy		1.5	3	6	12	18	1.5	3	6	12	18
1	3760340	Nixon	25	M	1	1	6 12	1 4	0	1	3+	2+	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1,3	1.11	1.3	1.36	1.04	0.6	0.95	1.18	1.2	0.9	0
					2	0	6 6	1 6	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	1.9	1.95	1.78	1.36	1.7	1.9	1.95	1.78	1.36
					3				0																				1.56	1.76	1.65	1.48	1.23	1.56	1.6	1.52	1.48	1.08
2	3866707	Kalailingam	27	M	1	2	6 12	1 2	0	0	0	0	0	0	1	2	1	0	1	0	0	0	0	0	0	0	0	0	1,2	1.26	1.3	1.36	1.18	0.78	1.11	1.3	1.2	1.04	0.78
					2	2	6 12	1 4	0	0	0	0	0	0	1	2	1	0	1	0	0	0	0	0	0	0	0	0	1,2	1.26	1.3	1.36	1.18	0.78	1.11	1.3	1.2	1.04	0.78
					3																									1.26	1.3	1.36	1.18	0.78	1.11	1.3	1.2	1.04	0.78
3	3858600	Navaneethamma	30	F	1	0	6 6	1 8	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52
					2	3	6 9	1 6	0	0	0	0	0	0	1	1	1	0	0	1	1	0	0	0	0	0	0	0	1,2,5	1.4	1.76	1.65	1.48	1.08	1.26	1.46	1.52	1.34	0.9
					3																									1.56	1.76	1.65	1.63	1.23	1.4	1.6	1.65	1.48	1.08
4	3858702	Amsavalli	35	F	1	4	6 18	1 9	0	1	3+	2+	1	0	1	2	1	1	0	0	2	0	0	0	0	0	0	0	1,2,3	1.11	1.3	1.36	1.18	0.9	0.95	1.18	1.2	1.04	0.78
					2	4	6 12	1 7	0	1	2+	2+	1	0	1	2	1	1	0	0	2	0	0	0	0	0	0	0	1,2,3	1.26	1.3	1.36	1.18	0.9	0.95	1.18	1.2	1.04	0.78
					3																									1.26	1.3	1.36	1.18	0.9	1.11	1.18	1.08	0	0
5	3770085	Satish kumar	22	M	1	0	6 6	1 2	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	1.9	1.95	1.63	1.52	1.7	1.9	1.81	1.78	1.52
					2	1	6 9	1 4	0	1	2+	1+	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1,3	1.4	1.6	1.81	1.48	1.08	1.4	1.46	1.36	1.18	0.9
					3																									1.56	1.76	1.81	1.48	1.08	1.4	1.6	1.52	1.48	1.23
6	3769239	Kumar	32	M	1	1	6 24	1 7	0	1	4+	2+	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1,3	1.26	1.3	1.2	1.04	0.78	1.11	1.3	1.2	0	0
					2	0	6 6	1 6	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.85	2.06	2.11	1.93	1.52	1.85	2.06	2.11	1.93	1.52
					3																									1.4	1.6	1.65	1.34	1.08	1.4	1.6	1.52	1.34	0.9
7	3809947	Rejina mary	42	F	1	1	6 12	1 9	0	1	2+	1+	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1,3	1.56	1.6	1.52	1.34	1.08	1.56	1.46	1.52	1.18	1.08
					2	0	6 6	1 4	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	1.9	1.81	1.63	1.36	1.7	1.9	1.81	1.63	1.36
					3																									1.56	1.76	1.65	1.48	1.08	1.56	1.76	1.65	1.34	1.08
8	3860869	Suganthi	26	F	1	0	6 6	1 5	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.78	1.52
					2	3	6 24	1 6	0	0	0	0	0	0	1	2	1	0	0	0	2	2	0	0	0	0	0	0	1,5	1.11	1.18	1.2	1.04	0.6	1.11	1.18	1.2	0.9	0.6
					3																									1.26	1.6	1.36	1.34	0.9	1.26	1.6	1.36	1.34	0.9
9	3865605	Kalimuthu	22	M	1	4	6 24	1 9	0	0	3+	2+	0	1	1	2	1	0	0	1	1	0	0	0	0	0	0	0	1,2,3,4	1.11	1.3	1.36	1.18	0.78	1.11	1.3	1.36	1.18	0.78
					2	4	6 36	1 4	0	1	3+	2+	0	1	1	2	1	0	0	1	1	0	0	0	0	0	0	0	1,2,3,4	1.11	1.3	1.36	1.18	0.78	1.11	1.3	1.36	1.18	0.78
					3																									1.11	1.3	1.36	1.18	0.78	1.11	1.3	1.36	1.18	0.78
10	3793782	Krishnaveni	45	F	1	2	6 12	1 2	0	0	0	0	0	0	1	2	1	1	1	0	0	0	0	0	0	0	0	0	1,2	1.26	1.46	1.52	1.34	1.08	1.26	1.46	1.52	1.34	1.08
					2	2	6 12	1 6	0	0	0	0	0	0	1	2	1	1	1	0	0	0	0	0	0	0	0	0	1,2	1.26	1.46	1.52	1.34	1.08	1.26	1.46	1.52	1.34	1.08
					3																									1.26	1.46	1.52	1.34	1.08	1.26	1.46	1.52	1.34	1.08
11	3861683	Alagumeena	16	F	1	3	6 18	1 8	0	0	0	0	0	0	1	2	1	0	0	1	1	0	0	0	0	0	0	0	1,2,5	1.4	1.6	1.65	1.48	1.23	1.4	1.6	1.65	1.48	1.23
					2	0	6 6	1 7	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.78	1.52
					3																									1.56	1.6	1.65	1.48	1.08	1.56	1.6	1.65	1.48	1.08
12	3857077	Kannan	40	M	1	0	6 6	1 1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.78	1.52
					2	1	6 24	1 6	0	1	3+	2+	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	1,3	1.26	1.46	1.36	1.04	0.78	1.26	1.46	1.36	1.04	0.78
					3																									1.4	1.6	1.65	1.34	1.23	1.4	1.6	1.65	1.34	1.08
13	3847038	Muthunayaki	45	F	1	4	6 36	1 8	0	1	3+	2+	0	0	1	2	1	1	1	0	0	2	0	0	0	0	0	0	1,2,3	1.11	1.18	1.2	1.04	0	0.95	1	1.08	0	0
					2	4	6 24	1 4	0	1	3+	2+	0	0	1	2	1	1	1	0	0	2	0	0	0	0	0	0	1,2,3	1.11	1.18	1.2	1.04	0	0.95	1	1.08	0	0
					3																									1.11	1.18	1.2	1.04	0	0.95	1	1.08	0	0
14	3814160	Senthilnathan	32	M	1	2	6 12	2 0	0	0	0	0	0	0	1	2	1	0	1	0	0	0	0	0	0	0	0	0	1,2	1.56	1.76	1.81	1.63	1.36	1.56	1.76	1.81	1.63	1.36
					2	0	6 6	1 8	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.85	2.06	2.11	1.93	1.66	1.85	2.06	2.11	1.93	1.66
					3																									1.7	1.76	1.81	1.48	1.36	1.7	1.76	1.81	1.48	1.36
15	3860190	Parakath Nisha	32	F	1	1	6 9	1 7	0	1	2+	1+	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1,3	1.4	1.6	1.65	1.48	1.23	1.4	1.6	1.65	1.34	1.23
					2	1	6 9	1 2	0	1	2+	1+	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1,3	1.4	1.6	1.65	1.48	1.23	1.4	1.6	1.65	1.34	1.23
					3																									1.4	1.6	1.65	1.48	1.23	1.4	1.6	1.65	1.34	1.23
16	3809870	Syed Ashraf Ali	42	M	1	1	6 9	1 4	0	0	3+	1+	0	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	1,3	1.56	1.6	1.52	1.34	1.08	1.56	1.46	1.52	1.18	1.08
					2	0	6 6	1 2	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	1.9	1.81	1.63	1.36	1.7	1.9	1.81	1.63	1.36
					3																									1.56	1.76	1.65	1.48	1.08	1.56	1.76	1.65	1.34	1.08
17	3782079	Madhubharathi	48	F	1	2	6 18	1 6	0	0	0	0	0	0	1	2	1	1	1	0	0	0	0	0	0	0	0	0	1,2	1.26	1.46	1.52	1.34	1.08	1.26	1.46	1.52	1.18	0.78
					2	2	6 12	1 5	0	0	0	0	0	0	1	2	1	1	1	0	0	0	0	0	0	0	0	0	1,2	1.26	1.46	1.52	1.34	1.08	1.26	1.46	1.52	1.18	0.78
					3																									1.26	1.46	1.52	1.34	1.08	1.26	1.46	1.52	1.18	0.78
18	3863517	Sivaiah	27	M	1	3	6 12	1 9	0	0	0	0	0	0	1	2	1	0	0	1	2	0	0	0	0	0	0	0	2,5	1.4	1.46	1.52	1.34	0.9	1.4	1.46	1.52	1.18	0.78
					2	0	6 6	1 7	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.85	2.06	2.11	1.93	1.66	1.85	2.06	2.11	1.93	1.66
					3																									1.56	1.76	1.65	1.48	1.08	1.56	1.76	1.65	1.48	1.08
19	3837544	Narayanan	41	M	1	4	6 18	1 2	0	0	3+	2+	0	0	1	2	1	1	1	1	2	0	0	0	0	0	0	0	1,2,3,4	1.26	1.46	1.36	1.18	0.9	1.11	1.3	1.36	1.18	0.9
					2	4	6 18	1 6	0	0	3+	2+	0	0	1	2	1	1	1	1	2	0	0	0	0	0	0	0	1,2,3,4	1.26	1.46	1.36	1.18	0.9	1.11	1.3	1.36	1.18	0.9
					3																									1.26	1.46	1.36	1.18	0.9	1.11	1.3	1.36	1.18	0.9

20	3855176	Ayyammal	27	F	1	1	6 12	1 7	0	1	3+	2+	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1,3	1.4	1.6	1.65	1.48	1.23	1.4	1.6	1.65	1.48	1.23
					2	1	6 12	1 5		1	3+	2+	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1,3	1.4	1.6	1.65	1.48	1.23	1.4	1.6	1.65	1.48	1.23
					3																									1.4	1.6	1.65	1.48	1.23	1.4	1.6	1.65	1.48	1.23
21	3863131	Muthumari	28	F	1	0	6 6	1 2	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.85	2.06	2.11	1.93	1.52	1.85	2.06	2.11	1.93	1.52
					2	1	6 24	1 5	0	1	4+	2+	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1,3	1.26	1.3	1.2	1.04	0.78	1.11	1.3	1.2	0	0
					3																									1.4	1.6	1.65	1.34	1.08	1.4	1.6	1.52	1.34	0.9
22	3789300	Indhumathi	28	F	1	1	6 12	1 2	0	1	2+	1+	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1,3	1.56	1.6	1.52	1.34	1.08	1.56	1.46	1.52	1.18	1.08
					2	0	6 6	1 6	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	1.9	1.81	1.63	1.36	1.7	1.9	1.81	1.63	1.36
					3																									1.56	1.76	1.65	1.48	1.08	1.56	1.76	1.65	1.34	1.08
23	3838594	Muthiah	37	M	1	3	6 24	1 8	0	0	0	0	0	0	1	2	1	0	0	0	2	2	0	0	0	0	0	0	1,5	1.11	1.18	1.2	1.04	0.6	1.11	1.18	1.2	0.9	0.6
					2	0	6 6	1 5	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.78	1.52
					3																									1.26	1.6	1.36	1.34	0.9	1.26	1.6	1.36	1.34	0.9
24	3869997	Chellammal	45	F	1	4	6 36	1 7	1	1	3+	2+	0	0	1	2	1	1	1	0	0	2	0	0	0	0	0	0	1,2,3	1.11	1.18	1.2	1.04	0	0.95	1	1.08	0	0
					2	4	6 24	1 6	1	1	3+	2+	0	0	1	2	1	1	1	0	0	2	0	0	0	0	0	0	1,2,3	1.11	1.18	1.2	1.04	0	0.95	1	1.08	0	0
					3																									1.11	1.18	1.2	1.04	0	0.95	1	1.08	0	0
25	3871440	Shanmugaraj	28	M	1	2	6 12	2 0	0	0	0	0	0	0	1	2	1	1	1	0	0	0	0	0	0	0	0	0	1,2	1.26	1.46	1.52	1.34	1.08	1.26	1.46	1.52	1.34	1.08
					2	2	6 12	1 7	0	0	0	0	0	0	1	2	1	1	1	0	0	0	0	0	0	0	0	0	1,2	1.26	1.46	1.52	1.34	1.08	1.26	1.46	1.52	1.34	1.08
					3																									1.26	1.46	1.52	1.34	1.08	1.26	1.46	1.52	1.34	1.08
26	1474680	Suriya priya	18	F	1	0	6 6	1 2	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.78	1.52
					2	3	6 18	1 4	0	0	0	0	0	0	1	2	1	0	0	1	1	0	0	0	0	0	0	0	1,2,5	1.4	1.6	1.65	1.48	1.23	1.4	1.6	1.65	1.48	1.23
					3																									1.56	1.6	1.65	1.48	1.08	1.56	1.6	1.65	1.48	1.08
27	3863450	Sreenivasan	36	M	1	1	6 24	1 6	0	1	3+	2+	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	1,3	1.26	1.46	1.36	1.04	0.78	1.26	1.46	1.36	1.04	0.78
					2	0	6 6	1 2	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.78	1.52
					3																									1.4	1.6	1.65	1.34	1.23	1.4	1.6	1.65	1.34	1.08
28	2561490	Vettaisamy	38	M	1	4	6 24	2 0	0	0	3+	2+	0	1	1	2	1	0	0	1	1	0	0	0	0	0	0	0	1,2,3,4	1.11	1.3	1.36	1.18	0.78	1.11	1.3	1.36	1.18	0.78
					2	4	6 36	1 8	0	1	3+	2+	0	1	1	2	1	0	0	1	1	0	0	0	0	0	0	0	1,2,3,4	1.11	1.3	1.36	1.18	0.78	1.11	1.3	1.36	1.18	0.78
					3																									1.11	1.3	1.36	1.18	0.78	1.11	1.3	1.36	1.18	0.78
29	3634225	Mercy	35	F	1	0	6 6	1 4	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.85	2.06	2.11	1.93	1.66	1.85	2.06	2.11	1.93	1.66
					2	2	6 12	1 7	0	0	0	0	0	0	1	2	1	0	1	0	0	0	0	0	0	0	0	0	1,2	1.56	1.76	1.81	1.63	1.36	1.56	1.76	1.81	1.63	1.36
					3																									1.7	1.76	1.81	1.48	1.36	1.7	1.76	1.81	1.48	1.36
30	3861038	Kalaivani	28	F	1	1	6 9	1 6	0	1	2+	1+	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1,3	1.4	1.6	1.65	1.48	1.23	1.4	1.6	1.65	1.34	1.23
					2	1	6 9	1 5	0	1	2+	1+	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1,3	1.4	1.6	1.65	1.48	1.23	1.4	1.6	1.65	1.34	1.23
					3																									1.4	1.6	1.65	1.48	1.23	1.4	1.6	1.65	1.34	1.23
31	3837325	Mariyam	35	F	1	4	6 18	1 4	0	1	3+	2+	0	0	1	2	1	1	0	1	1	1	0	0	0	0	0	0	1,3,5	1.26	1.46	1.36	1.18	1.08	1.26	1.46	1.36	1.18	1.08
					2	4	6 18	1 6	0	1	3+	2+	0	0	1	2	1	1	0	1	1	1	0	0	0	0	0	0	1,3,5	1.26	1.46	1.36	1.18	1.08	1.26	1.46	1.36	1.18	1.08
					3	0																								1.26	1.46	1.36	1.18	1.08	1.26	1.46	1.36	1.18	1.08
32	3864183	Vijay	33	M	1	1	6 24	1 2	0	1	4+	2+	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	1,2,3	1.11	1.18	1.2	1.04	0.6	0.95	1	1.08	0.9	0
					2	0	6 6	1 4	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.85	2.06	2.11	1.93	1.66	1.85	2.06	2.11	1.93	1.66
					3																									1.26	1.46	1.36	1.18	0.78	1.26	1.46	1.36	1.18	0.78
33	3068692	Banumathi	40	F	1	0	6 6	1 8	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.85	2.06	2.11	1.93	1.66	1.85	2.06	2.11	1.93	1.66
					2	2	6 18	1 6	0	0	0	0	0	0	1	2	1	1	1	0	0	0	0	0	0	0	0	0	1,2	1.11	1.18	1.2	1.04	0.6	0.95	1	1.08	0.9	0
					3																									1.26	1.46	1.36	1.18	0.78	1.26	1.46	1.36	1.18	0.78
34	3784005	Deepika	16	F	1	4	6 18	1 9	0	1	3+	2+	0	0	1	2	1	1	0	0	0	2	0	0	0	0	0	0	1,2,3	1.11	1.3	1.36	1.18	0.78	0.95	1.18	1.08	0.9	0.6
					2	4	618	1 7	0	1	3+	2+	0	0	1	2	1	1	0	0	0	2	0	0	0	0	0	0	1,2,3	1.11	1.3	1.36	1.18	0.78	0.95	1.18	1.08	0.9	0.6
					3	0																								1.11	1.3	1.36	1.18	0.78	0.95	1.18	1.08	0.9	0.6
35	3868073	Rajeswari	25	F	1	3	6 12	1 2	0	0	0	0	0	0	1	1	1	0	0	1	2	2	0	0	0	0	0	0	5	1.56	1.76	1.81	1.63	1.36	1.56	1.76	1.81	1.63	1.36
					2	0	6 6	1 4	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.85	2.06	2.11	1.93	1.66	1.85	2.06	2.11	1.93	1.66
					3																									1.56	1.9	1.81	1.78	1.52	1.56	1.9	1.81	1.78	1.52
36	3864443	Murugan	33	M	1	1	6 9	1 7	0	0	2+	1+	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1,2	1.56	1.9	1.81	1.63	1.36	1.56	1.6	1.65	1.48	1.23
					2	1	6 9	1 6	0	0	2+	1+	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1,2	1.56	1.9	1.81	1.63	1.36	1.56	1.6	1.65	1.48	1.23
					3																									1.56	1.9	1.81	1.63	1.36	1.56	1.6	1.65	1.48	1.23
37	3872753	Barathkumar	25	M	1	0	6 12	1 9	0	0	0	0	0	0	1	1	1	0	0	1	2	2	0	0	0	0	0	0	2,5	1.4	1.6	1.65	1.48	1.23	1.4	1.6	1.65	1.48	1.23
					2	3	6 6	1 4	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	2.06	2.11	1.78	1.52	1.7	2.06	2.11	1.78	1.52
					3																									1.56	1.76	1.81	1.63	1.23	1.56	1.76	1.81	1.63	1.23
38	3871184	Manikandan	30	M	1	4	6 18	1 5	0	1	3+	2+	0	0	1	2	1	1	0	1	1	1	0	0	0	0	0	0	1,3,5	1.26	1.46	1.36	1.18	1.08	1.26	1.46	1.36	1.18	1.08
					2	4	6 18	1 6	0	1	3+	2+	0	0	1	2	1	1	0	1	1	1	0	0	0	0	0	0	1,3,5	1.26	1.46	1.36	1.18	1.08	1.26	1.46	1.36	1.18	1.08
					3																									1.26	1.46	1.36	1.18	1.08	1.26	1.46	1.36	1.18	1.08
39	3842057	Jency George	32	F	1	2	6 12	1 9	0	0	0	0	0	0	1	2	1	1	1	0	0	0	0	0	0	0	0	0	1,2	1.56	1.76	1.81	1.63	1.36	1.4	1.6	1.65	1.48	1.23
					2	2	6 12	1 4	0	0	0	0	0	0	1	2	1	1	1	0	0	0	0	0	0	0	0	0	1,2	1.56	1.76	1.81	1.63	1.36	1.4	1.6	1.65	1.48	1.23
					3																									1.56	1.76	1.81	1.63	1.36	1.4	1.6	1.65	1.48	1.23
40	3865371	Shibukumar	37	M	1	0	6 6	1 2	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.78	1.52
					2	1	6 24	1 6	0	1	3+	2+	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	1,3	1.26	1.46	1.36	1.04	0.78	1.26	1.46	1.36	1.04	0.78
					3																									1.4	1.6	1.65	1.34	1.23	1.4	1.6	1.65	1.34	1.08
41	1480890	Ramadevi	41	F	1	4	6 12	1 8	1	1	3+	2+	0	0	1	2	1	1	1	0	2	2	0	0	0	0	0	0	1,2,3	1.4	1.6	1.65	1.48	1.23	1.26	1.46	1.52	1.34	0.9
					2	4	6 12	1 7	1	1	3+	2+	0	0	1	2	1	1	1	0	2	2	0	0	0	0	0	0	1,2,3	1.4	1.6	1.65	1.48	1.23	1.26	1.46	1.52	1.34	0.9
					3																									1.4	1.6	1.65	1.48	1.23	1.26	1.46	1.52	1.34	0.9
42	3865332	Jeyakumar	27	M	1	1	6 24	1 1	0	1	4+	2+	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	1,2,3	1.11	1.18	1.2	1.04	0.6	0.95	1	1.08	0.9	0
					2	0	6 6	1 6	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.85	2.06	2.11	1.93	1.66	1.85	2.06	2.11	1.93	1.66

					3																								1.26	1.46	1.36	1.18	0.78	1.26	1.46	1.36	1.18	0.78
43	3864400	Jeya	39	F	1	3	6	12	1	8	0	0	0	0	0	0	1	1	1	0	0	1	2	2	0	0	0	0	0	0	2,5	1.4	1.6	1.65	1.48	1.23	1.4	1.6	1.65	1.48	1.23
					2	0	6	6	1	4	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	2.06	2.11	1.78	1.52	1.7	2.06	2.11	1.78	1.52
					3																									1.56	1.76	1.81	1.63	1.23	1.56	1.76	1.81	1.63	1.23
44	3866459	Eswari	33	F	1	4	6	18	2	0	0	1	3+	2+	0	0	1	2	1	1	0	1	1	1	0	0	0	0	0	0	1,3,5	1.26	1.46	1.36	1.18	1.08	1.26	1.46	1.36	1.18	1.08
					2	4	6	18	1	8	0	1	3+	2+	0	0	1	2	1	1	0	1	1	1	0	0	0	0	0	0	1,3,5	1.26	1.46	1.36	1.18	1.08	1.26	1.46	1.36	1.18	1.08
					3																									1.26	1.46	1.36	1.18	1.08	1.26	1.46	1.36	1.18	1.08
45	3866468	Thiyagarajan	45	M	1	1	6	9	1	7	0	1	2+	1+	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1,3	1.4	1.6	1.65	1.48	1.23	1.4	1.6	1.65	1.34	1.23
					2	1	6	9	1	2	0	1	2+	1+	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1,3	1.4	1.6	1.65	1.48	1.23	1.4	1.6	1.65	1.34	1.23
					3																									1.4	1.6	1.65	1.48	1.23	1.4	1.6	1.65	1.34	1.23
46	1485607	Siva	27	M	1	0	6	6	1	4	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.78	1.52
					2	3	6	24	1	2	0	0	0	0	0	0	1	2	1	0	0	0	2	2	0	0	0	0	0	0	1,5	1.11	1.18	1.2	1.04	0.6	1.11	1.18	1.2	0.9	0.6
					3																									1.26	1.6	1.36	1.34	0.9	1.26	1.6	1.36	1.34	0.9
47	2704820	Ashwin	38	M	1	2	6	12	1	6	0	0	0	0	0	0	1	2	1	1	1	0	0	0	0	0	0	0	0	0	1,2	1.56	1.76	1.81	1.63	1.36	1.4	1.6	1.65	1.48	1.23
					2	2	6	12	1	5	0	0	0	0	0	0	1	2	1	1	1	0	0	0	0	0	0	0	0	0	1,2	1.56	1.76	1.81	1.63	1.36	1.4	1.6	1.65	1.48	1.23
					3																									1.56	1.76	1.81	1.63	1.36	1.4	1.6	1.65	1.48	1.23
48	3872775	Saraswathy	40	F	1	4	6	36	1	9	1	1	3+	2+	0	0	1	2	1	1	1	0	0	2	0	0	0	0	0	0	1,2,3	1.11	1.18	1.2	1.04	0	0.95	1	1.08	0	0
					2	4	6	24	1	7	1	1	3+	2+	0	0	1	2	1	1	1	0	0	2	0	0	0	0	0	0	1,2,3	1.11	1.18	1.2	1.04	0	0.95	1	1.08	0	0
					3																									1.11	1.18	1.2	1.04	0	0.95	1	1.08	0	0
49	3865473	Nagaraj	18	M	1	3	6	12	1	2	0	0	0	0	0	0	1	1	1	0	0	1	2	2	0	0	0	0	0	0	2,5	1.4	1.6	1.65	1.48	1.23	1.4	1.6	1.65	1.48	1.23
					2	0	6	6	1	6	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	2.06	2.11	1.78	1.52	1.7	2.06	2.11	1.78	1.52
					3																									1.56	1.76	1.81	1.63	1.23	1.56	1.76	1.81	1.63	1.23
50	3859659	Vijayalakshmi	32	F	1	1	6	24	1	7	0	1	4+	2+	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1,3	1.26	1.3	1.2	1.04	0.78	1.11	1.3	1.2	0	0
					2	0	6	6	1	5	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.85	2.06	2.11	1.93	1.52	1.85	2.06	2.11	1.93	1.52
					3																									1.4	1.6	1.65	1.34	1.08	1.4	1.6	1.52	1.34	0.9
51	1472017	Lakshmanan	36	M	1	4	6	24	1	2	0	0	3+	2+	0	1	1	2	1	0	0	1	1	0	0	0	0	0	0	0	1,2,3,4	1.11	1.3	1.36	1.18	0.78	1.11	1.3	1.36	1.18	0.78
					2	4	6	36	1	5	0	1	3+	2+	0	1	1	2	1	0	0	1	1	0	0	0	0	0	0	0	1,2,3,4	1.11	1.3	1.36	1.18	0.78	1.11	1.3	1.36	1.18	0.78
					3																									1.11	1.3	1.36	1.18	0.78	1.11	1.3	1.36	1.18	0.78
52	3864233	Sahira banu	18	F	1	0	6	6	1	2	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.78	1.52
					2	3	6	24	1	6	0	0	0	0	0	0	1	2	1	0	0	0	2	2	0	0	0	0	0	0	1,5	1.11	1.18	1.2	1.04	0.6	1.11	1.18	1.2	0.9	0.6
					3																									1.26	1.6	1.36	1.34	0.9	1.26	1.6	1.36	1.34	0.9
53	3872079	Madhu bharathi	40	F	1	2	6	18	1	8	0	0	0	0	0	0	1	2	1	1	1	0	0	0	0	0	0	0	0	0	1,2	1.26	1.46	1.52	1.34	1.08	1.26	1.46	1.52	1.18	0.78
					2	2	6	12	1	5	0	0	0	0	0	0	1	2	1	1	1	0	0	0	0	0	0	0	0	0	1,2	1.26	1.46	1.52	1.34	1.08	1.26	1.46	1.52	1.18	0.78
					3																									1.26	1.46	1.52	1.34	1.08	1.26	1.46	1.52	1.18	0.78
54	3363144	Purushothaman	42	M	1	4	6	36	1	7	1	1	3+	2+	0	0	1	2	1	1	1	1	2	2	0	0	0	0	0	0	1,2,3,5	1.11	1.3	1.36	1.18	0.9	0.95	1.18	1.2	1.04	0.78
					2	4	6	36	1	6	1	1	3+	2+	0	0	1	2	1	1	1	1	2	2	0	0	0	0	0	0	1,2,3,5	1.11	1.3	1.36	1.18	0.9	0.95	1.18	1.2	1.04	0.78
					3																									1.11	1.3	1.36	1.18	0.9	0.95	1.18	1.2	1.04	0.78

MASTER CHART

Pre Treatment

ensitivity

CS (Night)

Without glare					With glare					Quality of Life Assessment																														BCVA	NCT
										General functioning scale																			Psychosocial impact scale					Visual symptoms scale								
1.5	3	6	12	18	1.5	3	6	12	18	q1	q2	q3	q4	q5	q6	q7	q8	q9	q10	q11	q12	q13	q14	q15	q16	q17	q18	q19	q20	q21	q22	q23	q24	q25	q26	q27	q28	q29	q30	q31	q32	q33		
0.95	1.18	1.2	0	0	0.85	1	1.08	0	0																																6 9	1 2
1.7	1.9	1.95	1.78	1.36	1.7	1.9	1.95	1.78	1.36																																6 6	1 6
1.56	1.76	1.65	1.34	1.08	1.4	1.6	1.65	1.48	1.23	0	0	0	0	0	2	0	0	0	0	0	1	1	0	2	2	0	0	0	0	0	2	1	0	0	1	1	2	2	2	2	1	1		
1.26	1.3	1.36	1.18	0.78	1.11	1.18	1.2	1.04	0																																6 9	1 8
1.26	1.3	1.36	1.18	0.78	1.11	1.18	1.2	1.04	0																																6 9	1 7
1.26	1.3	1.36	1.18	0.78	1.11	1.18	1.2	1.04	0	0	0	0	0	0	2	1	1	2	0	0	1	1	0	3	3	1	0	0	0	0	2	1	1	1	1	2	2	2	2	2	1	2		
1.7	1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52																																6 6	1 1
1.4	1.6	1.65	1.34	1.08	1.26	1.46	1.52	1.18	0																																6 9	1 6
1.56	1.6	1.81	1.48	1.23	1.56	1.6	1.52	1.34	1.08	1	1	0	1	0	2	1	1	1	0	0	2	2	0	2	2	2	0	0	0	0	2	2	1	1	2	2	2	2	2	1	1	1		
0.95	1.18	1.2	0	0	0.85	0	0	0	0																																6 12	1 8
0.95	1.18	1.2	0	0	0.85	0	0	0	0																																6 12	1 4
0.95	1.18	1.2	0	0	0	0	0	0	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2	2	1	2	3	3	3	3	2	3	3		
1.7	1.9	1.95	1.63	1.52	1.7	1.9	1.81	1.63	1.36																																6 6	2 0
1.4	1.46	1.52	1.34	0.9	1.11	1.3	1.36	1.18	0.78																																6 6	1 8
1.46	1.6	1.65	1.48	1.23	1.26	1.46	1.52	1.34	1.08	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	1	0	0	0		
1.11	1.18	1.2	0.9	0.6	1.11	1	1.08	0	0																																6 9	1 7
1.85	2.06	2.11	1.93	1.52	1.85	2.06	2.11	1.93	1.52																																6 6	1 2
1.4	1.46	1.52	1.18	0.9	1.4	1.3	1.36	1.04	0.6	0	0	0	0	1	2	0	0	2	1	0	0	2	1	2	2	0	0	0	0	0	2	2	1	0	1	2	2	2	2	2	1	2		
1.56	1.46	1.52	1.18	0.9	1.56	1.3	1.36	1.04	0.78																																6 6	1 4
1.7	1.9	1.81	1.63	1.36	1.7	1.9	1.81	1.63	1.36																																6 6	1 2
1.56	1.6	1.52	1.34	1.08	1.56	1.46	1.52	1.18	0.78	0	0	0	0	0	2	0	0	1	0	0	1	0	2	2	0	0	0	0	0	0	2	1	1	0	1	2	2	2	2	1	1	2		
1.7	2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.78	1.52																																6 6	1 6
0.95	1	1.08	0	0	0.85	1	0	0	0																																6 12	1 5
1.26	1.6	1.36	1.34	0.9	1.26	1.6	1.2	0.9	0.6	1	1	1	1	1	2	1	1	2	1	2	2	2	3	3	1	1	1	1	1	3	3	3	2	3	3	3	3	3	3	3	3	3		
0.95	1.18	1.2	0	0	0.95	1	0	0	0																																6 36	1 9
0.95	1.18	0	0	0	0.95	1	0	0	0																																6 36	1 7
0.95	1.18	0	0	0	0.95	1	0	0	0	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		
1.26	1.46	1.36	1.18	0.9	1.11	1.18	1.2	1.04	0.78																																6 9	1 2
1.26	1.46	1.36	1.18	0.9	1.11	1.18	1.2	1.04	0.78																																6 9	1 6
1.26	1.46	1.36	1.18	0.9	1.11	1.18	1.2	1.04	0.78	1	1	1	1	1	2	1	1	1	1	1	2	2	1	2	2	1	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	2		
1.26	1.46	1.36	1.18	0.78	1.26	1.46	1.2	1.04	0.78																																6 12	1 7
1.7	2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.78	1.52																																6 6	1 5
1.4	1.6	1.52	1.18	1.08	1.4	1.6	1.52	1.18	0.9	1	1	1	1	1	3	1	1	2	1	1	2	2	2	2	2	1	1	1	1	1	3	2	1	1	2	3	3	3	3	2	1	3		
1.7	2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.63	1.36																																6 6	1 2
1.11	1.3	1.2	1.04	0.78	0.95	1.18	1.2	0	0																																6 36	1 5
1.4	1.6	1.65	1.18	0.9	1.4	1.46	1.65	1.18	0.78	1	1	1	1	1	2	2	2	2	2	1	2	2	2	2	2	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2		
0.95	1	1.08	0	0	0.85	1	0	0	0																																6 12	1 2
0.95	1	1.08	0	0	0.85	0	0	0	0																																6 9	1 6
0.95	1	1.08	0	0	0.85	0	0	0	0	2	2	2	2	2	3	2	3	3	2	2	3	3	3	3	1	1	2	1	1	1	3	3	3	2	3	3	3	3	3	3	3	3		
1.4	1.6	1.81	1.48	1.23	1.4	1.6	1.81	1.48	1.23																																6 9	1 8
1.85	2.06	2.11	1.93	1.66	1.85	2.06	2.11	1.93	1.66																																6 6	1 5
1.56	1.76	1.81	1.63	1.36	1.56	1.76	1.81	1.48	1.23	1	1	1	1	1	1	2	1	1	2	1	1	1	1	1	1	1	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	2		
1.4	1.6	1.52	1.34	1.23	1.4	1.46	1.52	1.34	1.08																																6 6	1 7
1.4	1.6	1.52	1.34	1.23	1.4	1.46	1.52	1.34	1.08																																6 6	1 6
1.4	1.6	1.52	1.34	1.23	1.4	1.46	1.52	1.34	1.08	1	1	1	1	1	2	1	2	2	1	1	2	2	2	2	2	1	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	2		
1.56	1.46	1.52	1.18	0.9	1.56	1.3	1.36	1.04	0.78																																6 6	2 0
1.7	1.9	1.81	1.63	1.36	1.7	1.9	1.81	1.63	1.36																																6 6	1 7
1.56	1.6	1.52	1.34	1.08	1.56	1.46	1.52	1.18	0.78	1	1	1	1	1	2	1	2	2	1	1	2	2	2	2	2	1	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	2		
1.11	1.3	1.36	1.18	0.78	1.11	1.18	1.08	0	0																																6 9	1 2
1.11	1.3	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36																																6 9	1 4
1.11	1.3	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1	1	1	1	1	3	3	3	3	3	2	2	3	3	3	3	1	1	1	1	1	3	3	3	2	3	3	3	3	3	3	3	3		
1.26	1.3	1.36	0	0	1.26	1.18	0	0	0																																6 9	1 6
1.85	2.06	2.11	1.93	1.66	1.85	2.06	2.11	1.93	1.66																																6 6	1 2
1.4	1.6	1.52	1.18	0.9	1.4	1.46	1.36	1.04	0.78	1	1	1	1	1	2	1	1	2	1	1	1	1	1	2	2	1	1	0	0	0	2	1	1	1	2	2	2	2	2	2	2	2		
0.95	1.18	1.2	1.04	0.6	0.85	1	1.08	0	0																																6 36	2 0
0.95	1.18	1.2	1.04	0.6	0.85	1	1.08	0	0																																6 36	1 8
0.95	1.18	1.2	1.04	0.6	0.85	1	1.08	0	0	1	1	1	1	1	2	1	2	2	2	1	2	2	2	2	2	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2		

1.4	1.6	1.65	1.48	1.23	1.4	1.46	1.52	1.34	1.08																																		6 9	1 4
1.4	1.6	1.65	1.48	1.23	1.4	1.46	1.52	1.34	1.08																																		6 9	1 7
1.4	1.6	1.65	1.48	1.23	1.4	1.46	1.52	1.34	1.08	1	1	1	1	1	2	1	1	2	1	1	1	2	1	2	2	0	0	0	0	0	2	1	1	1	2	2	2	2	2	2	2	2		
1.85	2.06	2.11	1.93	1.52	1.85	2.06	2.11	1.93	1.52																																		6 6	1 6
1.11	1.18	1.2	0.9	0.6	1.11	1	1.08	0	0																																		6 9	1 5
1.4	1.46	1.52	1.18	0.9	1.4	1.3	1.36	1.04	0.6	0	0	0	0	1	2	0	0	2	1	0	0	2	1	2	2	0	0	0	0	0	2	2	1	0	1	2	2	2	2	2	1	2		
1.56	1.46	1.52	1.18	0.9	1.56	1.3	1.36	1.04	0.78																																		6 6	1 4
1.7	1.9	1.81	1.63	1.36	1.7	1.9	1.81	1.63	1.36																																		6 6	1 6
1.56	1.6	1.52	1.34	1.08	1.56	1.46	1.52	1.18	0.78	0	0	0	0	0	2	0	0	1	0	0	1	0	2	2	0	0	0	0	0	0	2	1	1	0	1	2	2	2	2	1	1	2		
0.95	1	1.08	0	0	0.85	1	0	0	0																																		6 12	1 2
1.7	2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.78	1.52																																		6 6	1 4
1.26	1.6	1.36	1.34	0.9	1.26	1.6	1.2	0.9	0.6	1	1	1	1	1	2	1	1	2	1	2	2	2	3	3	1	1	1	1	1	3	3	3	2	3	3	3	3	3	3	3	3	3		
0.95	1	1.08	0	0	0.85	1	0	0	0																																		6 12	1 8
0.95	1	1.08	0	0	0.85	0	0	0	0																																		6 9	1 6
0.95	1	1.08	0	0	0.85	0	0	0	0	2	2	2	2	2	3	2	3	3	2	2	3	3	3	3	1	1	2	1	1	1	3	3	3	2	3	3	3	3	3	3	3	3		
1.26	1.46	1.36	1.18	0.9	1.11	1.18	1.2	0	0																																		6 9	1 9
1.26	1.46	1.36	1.18	0.9	1.11	1.18	1.2	0	0																																		6 9	1 7
1.26	1.46	1.36	1.18	0.9	1.11	1.18	1.2	0	0	1	1	1	1	1	2	1	1	1	1	1	2	2	1	2	2	1	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	2		
1.7	2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.78	1.52																																		6 6	1 2
1.26	1.46	1.36	1.18	0.78	1.26	1.46	1.2	1.04	0.78																																		6 12	1 4
1.4	1.6	1.52	1.18	1.08	1.4	1.6	1.52	1.18	0.9	1	1	1	1	1	3	1	1	2	1	1	2	2	2	2	2	1	1	1	1	1	3	2	1	1	2	3	3	3	3	2	1	3		
1.11	1.3	1.2	1.04	0.78	0.95	1.18	1.2	0	0																																		6 36	1 7
1.7	2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.63	1.36																																		6 6	1 6
1.4	1.6	1.65	1.18	0.9	1.4	1.46	1.65	1.18	0.78	1	1	1	1	1	2	2	2	2	2	1	2	2	2	2	2	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2		
0.95	1.18	1.2	0	0	0.95	1	0	0	0																																		6 36	1 9
0.95	1.18	0	0	0	0.95	1	0	0	0																																		6 36	1 4
0.95	1.18	0	0	0	0.95	1	0	0	0	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		
1.85	2.06	2.11	1.93	1.66	1.85	2.06	2.11	1.93	1.66																																		6 6	1 5
1.4	1.6	1.81	1.48	1.23	1.4	1.6	1.81	1.48	1.23																																		6 9	1 6
1.56	1.76	1.81	1.63	1.36	1.56	1.76	1.81	1.48	1.23	1	1	1	1	1	1	2	1	1	2	1	1	1	1	1	1	1	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	2		
1.4	1.6	1.52	1.34	1.23	1.4	1.46	1.52	1.34	1.08																																		6 6	1 9
1.4	1.6	1.52	1.34	1.23	1.4	1.46	1.52	1.34	1.08																																		6 6	1 4
1.4	1.6	1.52	1.34	1.23	1.4	1.46	1.52	1.34	1.08	1	1	1	1	1	2	1	2	2	1	1	2	2	2	2	2	1	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	2		
1.11	1.18	1.2	1.04	0.78	0.85	1	1.08	0	0																																		6 24	1 2
1.11	1.18	1.2	1.04	0.78	0	0	0	0	0																																		6 24	1 6
1.11	1.18	1.2	1.04	0.78	0	0	0	0	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
0	0	0	0	0	0	0	0	0	0																																		6 9	1 8
1.85	2.06	2.11	1.93	1.66	1.85	2.06	2.11	1.93	1.66																																		6 6	1 7
1.11	1.3	1.36	1.18	0.9	1.11	1.3	1.36	1.18	0.9	1	1	1	1	1	3	2	3	3	2	3	3	2	3	3	1	1	1	2	1	3	3	3	3	3	3	3	3	3	3	3	3			
1.85	2.06	2.11	1.93	1.66	1.85	2.06	2.11	1.93	1.66																																		6 6	1 1
0	0	0	0	0	0	0	0	0	0																																		6 18	1 6
1.11	1.3	1.36	1.18	0.9	1.11	1.3	1.36	1.18	0.9	1	1	1	1	1	3	1	3	3	1	3	3	1	3	3	1	1	1	1	1	3	3	3	3	3	3	3	3	3	3	3	3			
0.95	1	0	0	0	0	0	0	0	0																																		6 9	1 8
0.95	1	0	0	0	0	0	0	0	0																																		6 9	1 4
0.95	1	0	0	0	0	0	0	0	0	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		
1.4	1.46	1.52	1.34	1.08	1.11	1.3	1.36	1.18	0.9																																		6 24	2 0
1.85	2.06	2.11	1.93	1.66	1.85	2.06	2.11	1.93	1.66																																		6 6	1 8
1.56	1.76	1.81	1.63	1.23	1.56	1.76	1.81	1.63	1.23	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
1.26	1.46	1.52	1.34	1.08	1.26	1.46	1.36	1.18	0.9																																		6 9	1 7
1.26	1.46	1.52	1.34	1.08	1.26	1.46	1.36	1.18	0.9																																		6 9	1 2
1.26	1.46	1.52	1.34	1.08	1.26	1.46	1.36	1.18	0.9	1	1	1	1	1	2	1	2	2	1	1	1	2	2	1	2	2	1	1	1	1	2	2	2	1	2	2	2	2	2	2	2	2		
1.26	1.46	1.52	1.34	1.08	1.26	1.3	1.36	1.18	0.9																																		6 18	1 4
1.7	2.06	2.11	1.78	1.52	1.7	2.06	2.11	1.78	1.52																																		6 6	1 2
1.4	4.6	1.65	1.48	1.23	1.4	4.6	1.65	1.48	1.23	1	1	1	1	1	2	1	2	2	1	1	1	2	2	1	2	2	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2		
1.11	1.18	1.2	1.04	0.78	0.85	1	1.08	0	0																																		6 24	1 6
1.11	1.18	1.2	1.04	0.78	0	0	0	0	0																																		6 24	1 5
1.11	1.18	1.2	1.04	0.78	0	0	0	0	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
1.4	1.46	1.52	1.34	1.08	1.26	1.46	1.52	1.34	1.08																																		6 6	1 9
1.4	1.46	1.52	1.34	1.08	1.26	1.46	1.52	1.34	1.08																																		6 6	1 7
1.4	1.46	1.52	1.34	1.08	1.26	1.46	1.52	1.34	1.08	2	2	2	2	2	3	2	3	1	1	1	3	3	3	1	3	3	3	2	1	1	3	3	3	2	3	3	3	3	3	3	3	3		
1.7	2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.63	1.36																																		6 6	1 2
1.11	1.3	1.2	1.04	0.78	0.95	1.18	1.2	0	0																																		6 36	1 6
1.4	1.6	1.65	1.18	0.9	1.4	1.46	1.65	1.18	0.78	1	1	1	1	1	2	2	2	2	2	1	2	2	2	2	2	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2		
0.95	1.18	1.2	1.04	0.78	0.85	1	1.08	0	0																																		6 60	1 7
0.95	1.18	1.2	1.04	0.78	0.85	1	1.08	0	0																																		6 60	1 5
0.95	1.18	1.2	1.04	0.78	0.85	1	1.08	0	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2	3	2	3	3	3	3	3	3	3	3		
0	0	0	0	0	0	0	0	0	0																																		6 9	1 2
1.85	2.06	2.11	1.93	1.66	1.85	2.06	2.11	1.93	1.66																																		6 6	1 5

1.11	1.3	1.36	1.18	0.9	1.11	1.3	1.36	1.18	0.9	1	1	1	1	1	3	2	3	3	2	3	3	2	3	3	1	1	1	2	1	3	3	3	3	3	3	3	3	3	3	3	3			
1.26	1.46	1.52	1.34	1.08	1.26	1.3	1.36	1.18	0.9																																		6 18	1 2
1.7	2.06	2.11	1.78	1.52	1.7	2.06	2.11	1.78	1.52																																		6 6	1 6
1.4	4.6	1.65	1.48	1.23	1.4	4.6	1.65	1.48	1.23	1	1	1	1	1	2	1	2	2	1	1	1	2	2	1	2	2	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2		
1.11	1.18	1.2	1.04	0.78	0.85	1	1.08	0	0																																		6 24	1 8
1.11	1.18	1.2	1.04	0.78	0	0	0	0	0																																		6 24	1 5
1.11	1.18	1.2	1.04	0.78	0	0	0	0	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
1.4	1.6	1.52	1.34	1.23	1.4	1.46	1.52	1.34	1.08																																		6 6	1 7
1.4	1.6	1.52	1.34	1.23	1.4	1.46	1.52	1.34	1.08																																		6 6	1 6
1.4	1.6	1.52	1.34	1.23	1.4	1.46	1.52	1.34	1.08	1	1	1	1	1	2	1	2	2	1	1	2	2	2	2	2	1	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	2		
1.7	2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.78	1.52																																		6 6	1 9
0.95	1	1.08	0	0	0.85	1	0	0	0																																		6 12	1 7
1.26	1.6	1.36	1.34	0.9	1.26	1.6	1.2	0.9	0.6	1	1	1	1	1	2	1	1	2	1	2	2	2	3	3	1	1	1	1	1	3	3	3	2	3	3	3	3	3	3	3	3	3		
1.4	1.46	1.52	1.34	1.08	1.26	1.46	1.52	1.34	1.08																																		6 6	1 2
1.4	1.46	1.52	1.34	1.08	1.26	1.46	1.52	1.34	1.08																																		6 6	1 6
1.4	1.46	1.52	1.34	1.08	1.26	1.46	1.52	1.34	1.08	2	2	2	2	2	3	2	3	1	1	1	3	3	3	1	3	3	3	2	1	1	3	3	3	2	3	3	3	3	3	3	3	3		
0.95	1	1.08	0	0	0.85	1	0	0	0																																		6 12	1 7
0.95	1	1.08	0	0	0.85	0	0	0	0																																		6 9	1 5
0.95	1	1.08	0	0	0.85	0	0	0	0	2	2	2	2	2	3	2	3	3	2	2	3	3	3	3	1	1	2	1	1	1	3	3	3	2	3	3	3	3	3	3	3	3		
1.26	1.46	1.52	1.34	1.08	1.26	1.3	1.36	1.18	0.9																																		6 18	1 2
1.7	2.06	2.11	1.78	1.52	1.7	2.06	2.11	1.78	1.52																																		6 6	1 5
1.4	4.6	1.65	1.48	1.23	1.4	4.6	1.65	1.48	1.23	1	1	1	1	1	2	1	2	2	1	1	1	2	2	1	2	2	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2		
1.11	1.18	1.2	0.9	0.6	1.11	1	1.08	0	0																																		6 9	1 2
1.85	2.06	2.11	1.93	1.52	1.85	2.06	2.11	1.93	1.52																																		6 6	1 6
1.4	1.46	1.52	1.18	0.9	1.4	1.3	1.36	1.04	0.6	0	0	0	0	1	2	0	0	2	1	0	0	2	1	2	2	0	0	0	0	0	2	2	1	0	1	2	2	2	2	2	1	2		
0.95	1.18	1.2	0	0	0.95	1	0	0	0																																		6 36	1 8
0.95	1.18	0	0	0	0.95	1	0	0	0																																		6 36	1 5
0.95	1.18	0	0	0	0.95	1	0	0	0	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		
1.7	2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.78	1.52																																		6 6	1 7
0.95	1	1.08	0	0	0.85	1	0	0	0																																		6 12	1 6
1.26	1.6	1.36	1.34	0.9	1.26	1.6	1.2	0.9	0.6	1	1	1	1	1	2	1	1	2	1	2	2	2	3	3	1	1	1	1	1	3	3	3	2	3	3	3	3	3	3	3	3	3		
1.11	1.3	1.36	1.18	0.78	1.11	1.18	1.08	0	0																																		6 9	2 0
1.11	1.3	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36																																		6 9	1 7
1.11	1.3	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1	1	1	1	1	3	3	3	3	3	2	2	3	3	3	3	1	1	1	1	1	3	3	3	2	3	3	3	3	3	3	3	3		
0.85	1	0	0	0	0	0	0	0	0																																		6 12	1 2
0.85	1	0	0	0	0	0	0	0	0																																		6 9	1 4
0.85	1	0	0	0	0	0	0	0	0	2	2	2	2	2	3	2	3	3	2	2	2	2	3	3	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3		

1 Month Follow Up - Post Treatment

Anterior Segment							Posterior Segment												Treatment	Contrast Sensitivity										
																				CS (Day)										
																				Without glare					With glare					
Scleritis	Kps	AC cells	AC flare	Synechiae	Hypopyon	Lens status	Media	Vitreous cells	Vitreous opacities	Pars plana exudates	Vasculitis	Retinitis	Retinochoroiditis	Papillitis	VH	CME	ERM	CNVM	Optic atrophy		1.5	3	6	12	18	1.5	3	6	12	18	1.5
0	0	1+	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.56	1.76	1.81	1.63	1.23	1.4	1.6	1.65	1.34	1.08	1.4
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	1.9	1.95	1.78	1.36	1.7	1.9	1.95	1.78	1.36	1.7
																					1.7	1.76	1.81	1.63	1.36	1.7	1.76	1.65	1.63	1.36	1.7
0	0	0	0	0	0	1	1	1+	0	0	0	0	0	0	0	0	0	0	0	1	1.56	1.76	1.65	1.48	1.08	1.56	1.76	1.65	1.34	1.08	1.56
0	0	0	0	0	0	1	1	1+	0	0	0	0	0	0	0	0	0	0	0	1	1.56	1.76	1.65	1.48	1.08	1.56	1.76	1.65	1.34	1.08	1.56
																					1.7	1.76	1.81	1.63	1.36	1.56	1.76	1.65	1.34	1.08	1.56
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52	1.7
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.56	1.76	1.81	1.63	1.36	1.56	1.76	1.81	1.63	1.23	1.56
																					1.56	1.76	1.65	1.63	1.23	1.4	1.6	1.65	1.48	1.08	1.56
0	0	1+	1+	0	0	1	2	1+	0	0	0	0	0	0	0	0	0	0	0	1,2	1.4	1.6	1.65	1.48	1.08	1.26	1.46	1.52	1.34	1.08	1.26
0	0	1+	1+	0	0	1	2	1+	0	0	0	0	0	0	0	0	0	0	0	1,2	1.4	1.6	1.65	1.48	0.9	1.26	1.46	1.52	1.34	1.08	1.26
																					1.4	1.6	1.65	1.48	0.9	1.26	1.46	1.36	1.18	0.78	1.26
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	1.9	1.95	1.63	1.52	1.7	1.9	1.81	1.78	1.52	1.7
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	1.76	1.81	1.63	1.36	1.56	1.6	1.65	1.48	1.23	1.56
																					1.7	1.76	1.81	1.48	1.36	1.56	1.76	1.65	1.63	1.23	1.56
0	0	0	1+	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.56	1.76	1.81	1.48	1.23	1.4	1.6	1.65	1.48	1.08	1.56
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.85	2.06	2.11	1.93	1.52	1.85	2.06	2.11	1.93	1.52	1.85
																					1.7	1.9	1.81	1.63	1.23	1.7	1.9	1.81	1.63	1.23	1.56
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	1.76	1.65	1.48	1.23	1.7	1.6	1.65	1.34	1.08	1.56
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	1.9	1.81	1.63	1.36	1.7	1.9	1.81	1.63	1.36	1.7
																					1.56	1.76	1.65	1.48	1.23	1.56	1.76	1.65	1.34	1.23	1.56
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.78	1.52	1.7
0	0	0	0	0	0	1	2	1	0	0	0	0	2	0	0	0	0	0	0	1,5	1.26	1.3	1.36	1.18	0.9	1.26	1.3	1.36	1.18	0.9	1.26
																					1.4	1.6	1.65	1.34	1.08	1.4	1.6	1.65	1.34	1.08	1.4
0	0	2+	2+	0	0	1	2	1	0	0	1	1	0	0	0	0	1	0	0	1,2,3,4	0.95	1.18	1.2	1.04	0	0.95	1.18	1.2	1.04	0	0.85
0	1	2+	2+	0	0	1	2	1	0	0	1	1	0	0	0	0	1	0	0	1,2,3,4	0.95	1.18	1.2	1.04	0	0.95	1.18	1.2	1.04	0	0.85
																					0.95	1.18	1.2	0	0	0.95	1.18	1.2	0	0	0.85
0	0	0	0	0	0	1	2	1	1	1	0	0	0	0	0	0	0	0	0	1,2	1.4	1.6	1.65	1.48	1.23	1.4	1.6	1.65	1.48	1.23	1.26
0	0	0	0	0	0	1	2	1	1	1	0	0	0	0	0	0	0	0	0	1,2	1.4	1.6	1.65	1.48	1.23	1.4	1.6	1.65	1.48	1.23	1.26
																					1.4	1.6	1.65	1.48	1.23	1.4	1.6	1.65	1.48	1.23	1.26
0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1,2	1.56	1.76	1.81	1.48	1.36	1.56	1.76	1.81	1.48	1.36	1.4
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.78	1.52	1.7
																					1.56	1.6	1.65	1.48	1.08	1.56	1.6	1.65	1.48	1.08	1.4
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.78	1.52	1.7
0	1	3+	2+	1	0	3	2	0	0	0	0	0	0	0	0	0	0	0	0	1,2,3	1.11	1.3	1.2	1.04	0.78	1.11	1.3	1.2	1.04	0.78	0.95
																					1.26	1.52	1.65	1.34	0.9	1.26	1.52	1.52	1.18	0.9	1.11
0	1	1+	1+	0	0	1	2	1	0	0	0	0	2	0	0	0	0	0	0	1,2	1.4	1.6	1.65	1.48	1.08	1.26	1.3	1.36	1.18	0.9	1.26
0	1	1+	1+	0	0	1	2	1	0	0	0	0	2	0	0	0	0	0	0	1,2	1.4	1.6	1.65	1.48	1.08	1.26	1.3	1.36	1.18	0.9	1.26
																					1.11	1.18	1.2	1.04	0	1.26	1.3	1.36	1.18	0.9	1.26
0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1,2	1.7	1.76	1.81	1.78	1.36	1.7	1.76	1.81	1.63	1.36	1.56
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.85	2.06	2.11	1.93	1.66	1.85	2.06	2.11	1.93	1.66	1.85
																					1.7	1.76	1.81	1.48	1.36	1.7	1.76	1.81	1.48	1.36	1.56
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52	1.7
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52	1.7
																					1.7	1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52	1.7
0	0	0	0	0	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52	1.7
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52	1.7
																					1.7	1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52	1.7
0	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	1,2	1.56	1.76	1.81	1.63	1.52	1.56	1.76	1.65	1.63	1.36	1.4
0	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	1,2	1.56	1.76	1.81	1.63	1.52	1.56	1.76	1.65	1.63	1.36	1.4
																					1.56	1.76	1.81	1.63	1.52	1.56	1.76	1.65	1.63	1.36	1.4
0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	2,5	1.56	1.76	1.81	1.63	1.52	1.56	1.76	1.81	1.63	1.52	1.56
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.85	2.06	2.11	1.93	1.66	1.85	2.06	2.11	1.93	1.66	1.85
																					1.7	1.76	1.81	1.63	1.23	1.7	1.76	1.81	1.63	1.23	1.56
0	0	3+	2+	0	0	1	2	1	1	1	1	2	0	0	0	1	0	0	0	1,2,3,4	0.95	1.18	1.2	0.9	0.6	0.95	1.18	1.2	0.9	0.6	0
0	0	3+	2+	0	0	1	2	1	1	1	1	2	0	0	0	1	0	0	0	1,2,3,4	0.95	1.18	1.2	0.9	0.6	0.95	1.18	1.2	0.9	0.6	0
																					1.26	1.46	1.36	1.18	0.9	1.11	1.3	1.36	1.18	0.6	0

0	0	1+	1+	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1.56	1.76	1.95	1.63	1.36	1.56	1.76	1.95	1.63	1.36	1.56
0	0	1+	1+	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1.56	1.76	1.95	1.63	1.36	1.56	1.76	1.95	1.63	1.36	1.56
																					1.56	1.76	1.95	1.63	1.36	1.56	1.76	1.95	1.63	1.36	1.56
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.85	2.06	2.11	1.93	1.52	1.85	2.06	2.11	1.93	1.52	1.85
0	0	0	1+	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.56	1.76	1.81	1.48	1.23	1.4	1.6	1.65	1.48	1.08	1.56
																					1.7	1.9	1.81	1.63	1.23	1.7	1.9	1.81	1.63	1.23	1.56
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	1.76	1.65	1.48	1.23	1.7	1.6	1.65	1.34	1.08	1.56
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	1.9	1.81	1.63	1.36	1.7	1.9	1.81	1.63	1.36	1.7
																					1.56	1.76	1.65	1.48	1.23	1.56	1.76	1.65	1.34	1.23	1.56
0	0	0	0	0	0	1	2	1	0	0	0	0	2	0	0	0	0	0	0	1,5	1.26	1.3	1.36	1.18	0.9	1.26	1.3	1.36	1.18	0.9	1.26
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.78	1.52	1.7
																					1.4	1.6	1.65	1.34	1.08	1.4	1.6	1.65	1.34	1.08	1.4
0	1	1+	1+	0	0	1	2	1	0	0	0	0	2	0	0	0	0	0	0	1,2	1.4	1.6	1.65	1.48	1.08	1.26	1.3	1.36	1.18	0.9	1.26
0	1	1+	1+	0	0	1	2	1	0	0	0	0	2	0	0	0	0	0	0	1,2	1.4	1.6	1.65	1.48	1.08	1.26	1.3	1.36	1.18	0.9	1.26
																					1.11	1.18	1.2	1.04	0	1.26	1.3	1.36	1.18	0.9	1.26
0	0	0	0	0	0	1	2	1	1	1	0	0	0	0	0	0	0	0	0	1,2	1.4	1.6	1.65	1.48	1.23	1.4	1.6	1.65	1.48	1.23	1.26
0	0	0	0	0	0	1	2	1	1	1	0	0	0	0	0	0	0	0	0	1,2	1.4	1.6	1.65	1.48	1.23	1.4	1.6	1.65	1.48	1.23	1.26
																					1.4	1.6	1.65	1.48	1.23	1.4	1.6	1.65	1.48	1.23	1.26
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.78	1.52	1.7
0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1,2	1.56	1.76	1.81	1.48	1.36	1.56	1.76	1.81	1.48	1.36	1.4
																					1.56	1.6	1.65	1.48	1.08	1.56	1.6	1.65	1.48	1.08	1.4
0	1	3+	2+	1	0	3	2	0	0	0	0	0	0	0	0	0	0	0	0	1,2,3	1.11	1.3	1.2	1.04	0.78	1.11	1.3	1.2	1.04	0.78	0.95
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.78	1.52	1.7
																					1.26	1.52	1.65	1.34	0.9	1.26	1.52	1.52	1.18	0.9	1.11
0	0	2+	2+	0	0	1	2	1	0	0	1	1	0	0	0	0	1	0	0	1,2,3,4	0.95	1.18	1.2	1.04	0	0.95	1.18	1.2	1.04	0	0.85
0	1	2+	2+	0	0	1	2	1	0	0	1	1	0	0	0	0	1	0	0	1,2,3,4	0.95	1.18	1.2	0	0	0.95	1.18	1.2	0	0	0.85
																					0.95	1.18	1.2	0	0	0.95	1.18	1.2	0	0	0.85
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.85	2.06	2.11	1.93	1.66	1.85	2.06	2.11	1.93	1.66	1.85
0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1,2	1.7	1.76	1.81	1.78	1.36	1.7	1.76	1.81	1.63	1.36	1.56
																					1.7	1.76	1.81	1.48	1.36	1.7	1.76	1.81	1.48	1.36	1.56
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52	1.7
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52	1.7
																					1.7	1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52	1.7
0	1	3+	2+	0	0	1	2	1	1	0	1	1	1	0	1	0	1	0	0	1,3,5	0.95	1.18	1.2	1.04	0.78	0.85	1	1.08	0	0	0
0	1	3+	2+	0	0	1	2	1	1	0	1	1	1	0	1	0	1	0	0	1,3,5	0.95	1.18	1.2	1.04	0.78	0.85	1	1.08	0	0	0
																					0.95	1.18	1.2	1.04	0.78	0.85	1	1.08	0	0	0
0	0	0	1+	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1,2	1.56	1.76	1.81	1.63	1.36	1.56	1.76	1.81	1.63	1.36	1.4
0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.85	2.06	2.11	1.78	1.66	1.85	2.06	2.11	1.93	1.66	1.85
																					1.7	1.76	1.81	1.63	1.36	1.7	1.76	1.81	1.63	1.36	1.7
0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.85	2.06	2.11	1.93	1.66	1.85	2.06	2.11	1.93	1.66	1.85
0	0	0	0	0	0	1	2	1	1	1	0	0	0	0	0	0	0	0	0	1,2	1.11	1.18	1.2	1.04	0.6	0.95	1	1.08	0.9	0	0
																					0	1.46	1.36	1.18	0.78	1.26	1.46	1.36	1.18	0.78	1.11
0	0	0	1+	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1,2	1.56	1.76	1.65	1.34	1.08	1.56	1.76	1.65	1.34	1.08	1.4
0	0	0	1+	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1,2	1.56	1.76	1.65	1.34	1.08	1.56	1.76	1.65	1.34	1.08	1.4
																					1.56	1.76	1.65	1.34	1.08	1.56	1.76	1.65	1.34	1.08	1.4
0	0	0	0	0	0	1	2	1	0	0	1	2	2	1	0	0	0	0	0	2,5	0.95	1.18	1.2	1.04	0.78	0.85	1	1.08	0.9	0	0
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.85	2.06	2.11	1.93	1.66	1.85	2.06	2.11	1.93	1.66	1.85
																					1.26	1.46	1.52	1.34	1.08	1.11	1.3	1.36	1.18	0.9	0.95
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52	1.56
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52	1.56
																					1.7	1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52	1.56
0	0	0	0	0	0	1	2	1	0	0	1	2	2	1	0	0	1	0	0	2,5	0.95	1.18	1.2	1.04	0.78	0.85	1	1.08	0.9	0.6	0
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	2.06	2.11	1.78	1.52	1.7	2.06	2.11	1.78	1.52	1.7
																					1.11	1.3	1.52	1.18	0.9	1.11	1.3	1.52	1.18	0.9	1.11
0	1	3+	2+	0	0	1	2	1	1	0	1	1	1	0	1	0	1	0	0	1,3,5	0.95	1.18	1.2	1.04	0.78	0.85	1	1.08	0	0	0
0	1	3+	2+	0	0	1	2	1	1	0	1	1	1	0	1	0	1	0	0	1,3,5	0.95	1.18	1.2	1.04	0.78	0.85	1	1.08	0	0	0
																					0.95	1.18	1.2	1.04	0.78	0.85	1	1.08	0	0	0
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1,2	1.7	1.9	1.95	1.63	1.36	1.7	1.9	1.95	1.63	1.36	1.56
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1,2	1.7	1.9	1.95	1.63	1.36	1.7	1.9	1.95	1.63	1.36	1.56
																					1.7	1.9	1.95	1.63	1.36	1.7	1.9	1.95	1.63	1.36	1.56
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.78	1.52	1.7
0	1	3+	2+	1	0	3	2	0	0	0	0	0	0	0	0	0	0	0	0	1,2,3	1.11	1.3	1.2	1.04	0.78	1.11	1.3	1.2	1.04	0.78	0.95
																					1.26	1.52	1.65	1.34	0.9	1.26	1.52	1.52	1.18	0.9	1.11
1	1	3+	2+	1	0	1	2	1	1	1	0	2	2	0	0	1	0	0	0	1,2,3,4	0.85	1	1.08	0	0	0	0	0	0	0	0
1	1	3+	2+	1	0	1	2	1	1	1	0	2	2	0	0	1	0	0	0	1,2,3,4	0.85	1	1.08	0	0	0	0	0	0	0	0
																					0.85	1	1.08	0	0	0	0	0	0	0	0
0	0	0	1+	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1,2	1.56	1.76	1.81	1.63	1.36	1.56	1.76	1.81	1.63	1.36	1.4
0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.85	2.06	2.11	1.78	1.66	1.85	2.06	2.11	1.93	1.66	1.85

																						1.7	1.76	1.81	1.63	1.36	1.7	1.76	1.81	1.63	1.36	1.7
0	0	0	0	0	0	1	2	1	0	0	1	2	2	1	0	0	1	0	0	2,5		0.95	1.18	1.2	1.04	0.78	0.85	1	1.08	0.9	0.6	0
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0		0	1.7	2.06	2.11	1.78	1.52	1.7	2.06	2.11	1.78	1.52	1.7
																						1.11	1.3	1.52	1.18	0.9	1.11	1.3	1.52	1.18	0.9	1.11
0	1	3+	2+	0	0	1	2	1	1	0	1	1	1	0	1	0	1	0	0	1,3,5		0.95	1.18	1.2	1.04	0.78	0.85	1	1.08	0	0	0
0	1	3+	2+	0	0	1	2	1	1	0	1	1	1	0	1	0	1	0	0	1,3,5		0.95	1.18	1.2	1.04	0.78	0.85	1	1.08	0	0	0
																						0.95	1.18	1.2	1.04	0.78	0.85	1	1.08	0	0	0
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0		0	1.7	1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52	1.7
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0		0	1.7	1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52	1.7
																						1.7	1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52	1.7
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0		0	1.7	2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.78	1.52	1.7
0	0	0	0	0	0	1	2	1	0	0	0	0	2	0	0	0	0	0	0	1,5		1.26	1.3	1.36	1.18	0.9	1.26	1.3	1.36	1.18	0.9	1.26
																						1.4	1.6	1.65	1.34	1.08	1.4	1.6	1.65	1.34	1.08	1.4
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1,2		1.7	1.9	1.95	1.63	1.36	1.7	1.9	1.95	1.63	1.36	1.56
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1,2		1.7	1.9	1.95	1.63	1.36	1.7	1.9	1.95	1.63	1.36	1.56
																						1.7	1.9	1.95	1.63	1.36	1.7	1.9	1.95	1.63	1.36	1.56
0	1	1+	1+	0	0	1	2	1	0	0	0	0	2	0	0	0	0	0	0	1,2		1.4	1.6	1.65	1.48	1.08	1.26	1.3	1.36	1.18	0.9	1.26
0	1	1+	1+	0	0	1	2	1	0	0	0	0	2	0	0	0	0	0	0	1,2		1.4	1.6	1.65	1.48	1.08	1.26	1.3	1.36	1.18	0.9	1.26
																						1.11	1.18	1.2	1.04	0	1.26	1.3	1.36	1.18	0.9	1.26
0	0	0	0	0	0	1	2	1	0	0	1	2	2	1	0	0	1	0	0	2,5		0.95	1.18	1.2	1.04	0.78	0.85	1	1.08	0.9	0.6	0
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0		0	1.7	2.06	2.11	1.78	1.52	1.7	2.06	2.11	1.78	1.52	1.7
																						1.11	1.3	1.52	1.18	0.9	1.11	1.3	1.52	1.18	0.9	1.11
0	0	0	1+	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0		0	1.56	1.76	1.81	1.48	1.23	1.4	1.6	1.65	1.48	1.08	1.56
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0		0	1.85	2.06	2.11	1.93	1.52	1.85	2.06	2.11	1.93	1.52	1.85
																						1.7	1.9	1.81	1.63	1.23	1.7	1.9	1.81	1.63	1.23	1.56
0	0	2+	2+	0	0	1	2	1	0	0	1	1	0	0	0	0	1	0	0	1,2,3,4		0.95	1.18	1.2	1.04	0	0.95	1.18	1.2	1.04	0	0.85
0	1	2+	2+	0	0	1	2	1	0	0	1	1	0	0	0	0	1	0	0	1,2,3,4		0.95	1.18	1.2	0	0	0.95	1.18	1.2	0	0	0.85
																						0.95	1.18	1.2	0	0	0.95	1.18	1.2	0	0	0.85
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0		0	1.7	2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.78	1.52	1.7
0	0	0	0	0	0	1	2	1	0	0	0	0	2	0	0	0	0	0	0	1,5		1.26	1.3	1.36	1.18	0.9	1.26	1.3	1.36	1.18	0.9	1.26
																						1.4	1.6	1.65	1.34	1.08	1.4	1.6	1.65	1.34	1.08	1.4
0	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	1,2		1.56	1.76	1.81	1.63	1.52	1.56	1.76	1.65	1.63	1.36	1.4
0	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	1,2		1.56	1.76	1.81	1.63	1.52	1.56	1.76	1.65	1.63	1.36	1.4
																						1.56	1.76	1.81	1.63	1.52	1.56	1.76	1.65	1.63	1.36	1.4
0	0	1+	1+	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1,2,5		1.56	1.76	1.65	1.34	1.08	1.4	1.6	1.65	1.48	0.9	1.11
0	0	1+	1+	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1,2,5		1.56	1.76	1.65	1.34	1.08	1.4	1.6	1.65	1.48	0.9	1.11
																						1.56	1.76	1.65	1.34	1.08	1.4	1.6	1.65	1.48	0.9	1.11

CS (Night)									Quality of Life Assessment																																	
Without glare				With glare					General functioning scale																					Psychosocial impact scale					Visual symptoms scale						
3	6	12	18	1.5	3	6	12	18	q1	q2	q3	q4	q5	q6	q7	q8	q9	q10	q11	q12	q13	q14	q15	q16	q17	q18	q19	q20	q21	q22	q23	q24	q25	q26	q27	q28	q29	q30	q31	q32	q33
1.6	1.65	1.34	0.9	1.26	1.46	1.52	1.18	0.78																																	
1.9	1.95	1.78	1.36	1.7	1.9	1.95	1.78	1.36																																	
1.76	1.81	1.63	1.36	1.4	1.6	1.65	1.34	1.08	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	0	0	0	0	1	1	1	1	0	0	1
1.76	1.65	1.48	1.08	1.4	1.6	1.52	1.18	0.9																																	
1.76	1.65	1.48	1.08	1.4	1.6	1.52	1.18	0.9																																	
1.76	1.65	1.48	1.08	1.4	1.6	1.52	1.18	0.9	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	0	0	0	0	1	1	1	1	1	1	1
1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52																																	
1.76	1.81	1.63	1.36	1.56	1.6	1.65	1.34	0.9																																	
1.6	1.81	1.48	1.23	1.56	1.76	1.65	1.48	1.23	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	0	0	0	0	1	1	1	1	0	0	1
1.46	1.52	1.34	1.08	1.11	1.3	1.36	1.04	0.78																																	
1.46	1.52	1.34	1.08	1.11	1.3	1.36	1.04	0.78																																	
1.46	1.52	1.34	1.08	1.11	1.3	1.36	1.04	0.6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	1	1	1	1
1.9	1.95	1.63	1.52	1.7	1.9	1.81	1.63	1.36																																	
1.6	1.65	1.48	1.23	1.4	1.46	1.52	1.34	1.08																																	
1.6	1.65	1.48	1.23	1.56	1.46	1.52	1.34	1.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0
1.76	1.65	1.48	1.23	1.4	1.46	1.52	1.34	0.9																																	
2.06	2.11	1.93	1.52	1.85	2.06	2.11	1.93	1.52																																	
1.76	1.81	1.63	1.23	1.56	1.6	1.65	1.48	1.08	0	0	0	0	0	1	0	0	1	0	0	0	1	0	1	1	0	0	0	0	0	1	0	0	0	0	1	1	1	1	1	0	1
1.6	1.52	1.48	1.08	1.56	1.6	1.52	1.34	1.08																																	
1.9	1.81	1.63	1.36	1.7	1.9	1.81	1.63	1.36																																	
1.6	1.52	1.34	1.08	1.56	1.76	1.65	1.18	1.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	1
2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.78	1.52																																	
1.3	1.36	1.18	0.9	1.11	1.3	1.2	1.04	0																																	
1.46	1.52	1.18	0.9	1.4	1.3	1.36	1.18	0.78	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	2	2	2	2	2	2	2
0	0	0	0	0	0	0	0	0																																	
0	0	0	0	0	0	0	0	0																																	
0	0	0	0	0	0	0	0	0	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
1.46	1.52	1.34	1.08	1.11	1.18	1.2	1.04	0.78																																	
1.46	1.52	1.34	1.08	1.11	1.18	1.2	1.04	0.78																																	
1.46	1.52	1.34	1.08	1.11	1.18	1.2	1.04	0.78	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	2	2	2	2	2	1	2
1.6	1.52	1.34	0.9	1.4	1.6	1.52	1.34	0.9																																	
2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.78	1.52																																	
1.76	1.81	1.48	0.9	1.4	1.6	1.52	1.18	0.9	0	0	0	0	0	1	0	0	1	0	0	1	1	0	1	1	0	0	0	0	0	1	1	1	1	1	2	2	2	2	2	2	2
2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.63	1.36																																	
1.18	1.08	0	0	0.95	0	0	0	0																																	
1.3	1.36	1.18	0.9	1.11	1.3	1.2	0.9	0.78	2	2	2	2	2	3	1	1	3	1	1	2	2	2	2	3	3	1	1	1	1	3	3	3	2	3	3	3	3	3	3	3	3
1.46	1.52	1.34	0.9	1.11	1.3	1.36	1.04	0.78																																	
1.46	1.52	1.34	0.9	1.11	1.3	1.36	1.04	0.78																																	
1.46	1.52	1.34	0.9	1.11	1.3	1.36	1.04	0.78	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
1.6	1.81	1.48	1.36	1.4	1.6	1.81	1.48	1.23																																	
2.06	2.11	1.93	1.66	1.85	2.06	2.11	1.93	1.66																																	
1.76	1.81	1.63	1.36	1.56	1.76	1.81	1.48	1.23	0	0	0	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	1	1	1	0	1	1	1	1	1	1	1	1
1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52																																	
1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52																																	
1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52																																	
1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52																																	
1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.6	1.65	1.48	1.23	1.4	1.6	1.65	1.04	0.9																																	
1.6	1.65	1.48	1.23	1.4	1.6	1.65	1.04	0.9																																	
1.6	1.65	1.48	1.23	1.4	1.6	1.65	1.04	0.9	0	0	0	0	0	1	0	1	1	1	0	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
1.6	1.65	1.48	1.23	1.56	1.6	1.65	1.34	1.08																																	
2.06	2.11	1.93	1.66	1.85	2.06	2.11	1.93	1.66																																	
1.76	1.81	1.48	1.08	1.56	1.76	1.81	1.48	1.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	1	1	1	1	1	1
0	0	0	0	0	0	0	0	0																																	
0	0	0	0	0	0	0	0	0																																	
0	0	0	0	0	0	0	0	0	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

1.76	1.65	1.48	1.23	1.4	1.46	1.65	1.48	1.08																																	
1.76	1.65	1.48	1.23	1.4	1.46	1.65	1.48	1.08																																	
1.76	1.65	1.48	1.23	1.4	1.46	1.65	1.48	1.08	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	1	1	1	1	1	1
2.06	2.11	1.93	1.52	1.85	2.06	2.11	1.93	1.52																																	
1.76	1.65	1.48	1.23	1.4	1.46	1.52	1.34	0.9																																	
1.76	1.81	1.63	1.23	1.56	1.6	1.65	1.48	1.08	0	0	0	0	0	1	0	0	1	0	0	0	1	0	1	1	0	0	0	0	0	1	0	0	0	0	1	1	1	1	1	0	1
1.6	1.52	1.48	1.08	1.56	1.6	1.52	1.34	1.08																																	
1.9	1.81	1.63	1.36	1.7	1.9	1.81	1.63	1.36																																	
1.6	1.52	1.34	1.08	1.56	1.76	1.65	1.18	1.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	1
1.3	1.36	1.18	0.9	1.11	1.3	1.2	1.04	0																																	
2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.78	1.52																																	
1.46	1.52	1.18	0.9	1.4	1.3	1.36	1.18	0.78	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	2	2	2	2	2	2	2
1.46	1.52	1.34	0.9	1.11	1.3	1.36	1.04	0.78																																	
1.46	1.52	1.34	0.9	1.11	1.3	1.36	1.04	0.78																																	
1.46	1.52	1.34	0.9	1.11	1.3	1.36	1.04	0.78	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
1.46	1.52	1.34	1.08	1.11	1.18	1.2	1.04	0.78																																	
1.46	1.52	1.34	1.08	1.11	1.18	1.2	1.04	0.78																																	
1.46	1.52	1.34	1.08	1.11	1.18	1.2	1.04	0.78	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	2	2	2	2	2	1	2
2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.78	1.52																																	
1.6	1.52	1.34	0.9	1.4	1.6	1.52	1.34	0.9																																	
1.76	1.81	1.48	0.9	1.4	1.6	1.52	1.18	0.9	0	0	0	0	0	1	0	0	1	0	0	1	1	0	1	1	0	0	0	0	0	1	1	1	1	1	2	2	2	2	2	2	2
1.18	1.08	0	0	0.95	0	0	0	0																																	
2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.63	1.36																																	
1.3	1.36	1.18	0.9	1.11	1.3	1.2	0.9	0.78	2	2	2	2	2	3	1	1	3	1	1	2	2	2	2	3	3	1	1	1	1	3	3	3	2	3	3	3	3	3	3	3	3
0	0	0	0	0	0	0	0	0																																	
0	0	0	0	0	0	0	0	0																																	
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2.06	2.11	1.93	1.66	1.85	2.06	2.11	1.93	1.66																																	
1.6	1.81	1.48	1.36	1.4	1.6	1.81	1.48	1.23																																	
1.76	1.81	1.63	1.36	1.56	1.76	1.81	1.48	1.23	0	0	0	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	1	1	1	0	1	1	1	1	1	1	1	1
1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52																																	
1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52																																	
1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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0	0	0	0.78	0	0	0	0	0																																	
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1.46	1.52	1.34	1.08	1.4	1.46	1.52	1.34	1.08																																	
2.06	2.11	1.93	1.66	1.85	2.06	2.11	1.93	1.66																																	
1.76	1.81	1.63	1.36	1.56	1.6	1.65	1.48	1.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.06	2.11	1.93	1.66	1.85	2.06	2.11	1.93	1.66																																	
0	0	0	0	0	0	0	0	0																																	
1.3	1.36	1.18	0.9	1.11	1.3	1.36	1.18	0.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.6	1.52	1.34	1.08	1.4	1.6	1.52	1.34	1.08																																	
1.6	1.52	1.34	1.08	1.4	1.6	1.52	1.34	1.08																																	
1.6	1.52	1.34	1.08	1.4	1.6	1.52	1.34	1.08	0	0	0	0	0	1	1	1	1	0	0	1	1	0	1	1	0	0	0	0	0	1	1	0	0	1	1	1	1	1	1	1	1
0	0	0	0	0	0	0	0	0																																	
2.06	2.11	1.93	1.66	1.85	2.06	2.11	1.93	1.66																																	
1.18	1.2	1.04	0.78	0.85	1	1.08	0.9	0.6	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
1.76	1.81	1.63	1.36	1.4	1.6	1.65	1.48	1.23																																	
1.76	1.81	1.63	1.36	1.4	1.6	1.65	1.48	1.23																																	
1.76	1.81	1.63	1.36	1.4	1.6	1.65	1.48	1.23	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	1	1	1	1	1	1
0	0	0	0	0	0	0	0	0																																	
2.06	2.11	1.78	1.52	1.7	2.06	2.11	1.78	1.52																																	
1.3	1.52	1.18	0.9	0.95	1.18	1.2	0.9	0	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
0	0	0	0	0	0	0	0	0																																	
0	0	0	0.78	0	0	0	0	0																																	
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1.76	1.81	1.63	1.36	1.56	1.76	1.65	1.34	1.08																																	
1.76	1.81	1.63	1.36	1.56	1.76	1.65	1.34	1.08																																	
1.76	1.81	1.63	1.36	1.56	1.76	1.65	1.34	1.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.63	1.36																																	
1.18	1.08	0	0	0.95	0	0	0	0																																	
1.3	1.36	1.18	0.9	1.11	1.3	1.2	0.9	0.78	2	2	2	2	2	3	1	1	3	1	1	2	2	2	2	3	3	1	1	1	1	3	3	3	2	3	3	3	3	3	3	3	3
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1.46	1.52	1.34	1.08	1.4	1.46	1.52	1.34	1.08																																	
2.06	2.11	1.93	1.66	1.85	2.06	2.11	1.93	1.66																																	

1.76	1.81	1.63	1.36	1.56	1.6	1.65	1.48	1.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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2.06	2.11	1.78	1.52	1.7	2.06	2.11	1.78	1.52																																
1.3	1.52	1.18	0.9	0.95	1.18	1.2	0.9	0	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
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1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52																																
1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52																																
1.9	1.95	1.78	1.52	1.7	1.9	1.95	1.78	1.52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.78	1.52																																
1.3	1.36	1.18	0.9	1.11	1.3	1.2	1.04	0																																
1.46	1.52	1.18	0.9	1.4	1.3	1.36	1.18	0.78	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	2	2	2	2	2	2	2
1.76	1.81	1.63	1.36	1.56	1.76	1.65	1.34	1.08																																
1.76	1.81	1.63	1.36	1.56	1.76	1.65	1.34	1.08																																
1.76	1.81	1.63	1.36	1.56	1.76	1.65	1.34	1.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.46	1.52	1.34	0.9	1.11	1.3	1.36	1.04	0.78																																
1.46	1.52	1.34	0.9	1.11	1.3	1.36	1.04	0.78																																
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2.06	2.11	1.78	1.52	1.7	2.06	2.11	1.78	1.52																																
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2.06	2.11	1.93	1.52	1.85	2.06	2.11	1.93	1.52																																
1.76	1.81	1.63	1.23	1.56	1.6	1.65	1.48	1.08	0	0	0	0	0	1	0	0	1	0	0	0	1	0	1	1	0	0	0	0	0	1	0	0	0	0	1	1	1	1	1	0	1
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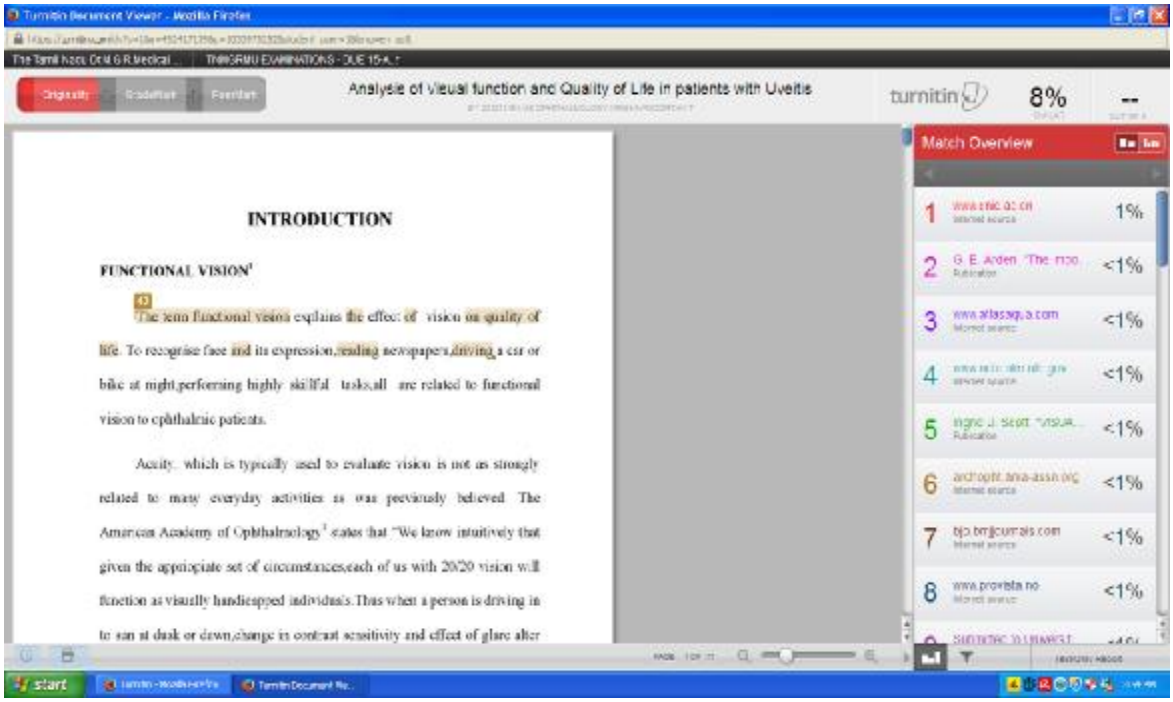
2.06	1.95	1.78	1.52	1.7	2.06	1.95	1.78	1.52																																
1.3	1.36	1.18	0.9	1.11	1.3	1.2	1.04	0																																
1.46	1.52	1.18	0.9	1.4	1.3	1.36	1.18	0.78	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	2	2	2	2	2	2	2
1.6	1.65	1.48	1.23	1.4	1.6	1.65	1.04	0.9																																
1.6	1.65	1.48	1.23	1.4	1.6	1.65	1.04	0.9																																
1.6	1.65	1.48	1.23	1.4	1.6	1.65	1.04	0.9	0	0	0	0	0	1	0	1	1	1	0	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
1.3	1.36	1.18	0.78	1.11	1.3	1.2	1.04	0.6																																
1.3	1.36	1.18	0.78	1.11	1.3	1.2	1.04	0.6																																
1.3	1.36	1.18	0.78	1.11	1.3	1.2	1.04	0.6	1	1	1	1	1	2	2	2	2	1	1	1	1	1	2	2	1	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	2



INTRODUCTION

FUNCTIONAL VISION[1]

The term functional vision explains the effect of vision on quality of life. To recognise face and its expression,reading newspapers,driving a car or bike at night,performing highly skillful tasks,all are related to functional vision to ophthalmic patients.

Acuity, which is typically used to evaluate vision is not as strongly related to many everyday activities as was previously believed. The American Academy of Ophthalmology[1] states that "We know intuitively that given the appropriate set of circumstances,each of us with 20/20 vision will function as visually handicapped individuals.Thus when a person is driving in to sun at dusk or dawn,change in contrast sensitivity and effect of glare alter

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INTRODUCTION

FUNCTIONAL VISION