ASSESMENT OF VISUAL ACUITY, CONTRAST SENSITIVITY AND VISUAL FIELD AMONG INDIVIDUALS WEARING COSMETIC CONTACT LENSES OF VARIOUS CENTRAL ZONE DIAMETER UNDER MESOPIC CONDITIONS

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ABSTRACT

Background: The appearance of the eyes can be altered with cosmetic contact lenses. These contact lenses are available with different central zone diameter.

Aim: To evaluate the visual acuity, contrast sensitivity and visual field among individuals wearing cosmetic contact lenses of various central zone diameter under mesopic conditions.

Materials and methods: A comparitive cross sectional study design was used. This study included 240 eyes of 120 individuals with age between 18-35 years. Data was collected at Alnafees Medical Hospital Islamabad. Visual acuity, contrast sensitivity and visual field were assesed using logmar chart, pellirobson chart and bernell hand disc perimetry respectively. Participants were divided into two groups. Group A using the contact lenses with clear zone diameter of 5.5 mm. Group B using the contact lenses with clear zone diameter of 6.4 mm. The procedure beguns by applying mesopic conditions. Visual functions were measured before and after mesopic condition were applied. Data was analysed using independent sample T –test and Paired sample T-test.

Results: A statistically significant differences were observed in terms of visual acuity with a mean value of 0.1910 for group A and 0.065 for group B. Also for group A the mean value for contrast sensitivity, temporal visual field, nasal visual field, superior visual field and inferior visual field were 1.4873, 78.9583, 49.1250, 44.1667 and 67.1000 respectively. For group B the mean value for contrast sensitivity, temporal visual field, nasal visual field, superior visual field and inferior visual field were 1.7963, 88.2917, 56.8750, 52.9167 and 72.5417 under the mesopic light (P value=0.00).

Conclusion: The study concluded that in comparison to contact lenses with large optic zone diameters 6.4 mm, it was observed that visual acuity, contrast sensitivity, and visual field reduced significantly in contact lenses with small optic zone diameters 5.5 mm under mesopic condition.

Keywords: Contact lenses, contrast sensitivity, mesopic vision, visual acuity, visual field

INTRODUCTION

Contact lenses, synthetic prosthetics worn on the front surface of the eye, can replace the anterior corneal surface. Refractive error and abnormalities on the corneal surface can be corrected by contact lenses (1). There are over 150 million people in the world currently wear some form of contact lenses. Vision correction, treatment of medical conditions, and aesthetic purposes are among the primary uses of contact lenses. Over time, materials utilized in contact lenses have undergone tremendous research in order to decrease the side effects of wearing contacts, maintain tear film stability and maintain a normal corneal metabolism (2).

Colored contact lenses were primarily created for patients with abnormal iris and corneal defects, cosmetic contact lenses are also used for cosmetic enhancement by healthy people (3). Cosmetic contact lenses are available in both prescription and Plano form. Myopia, hyperopia, or astigmatism can all be treated using prescription cosmetic contacts, which can also be used to modify the color of the eyes. Plano cosmetic contacts are only worn to modify the color of the eyes cosmetically; they do not contain any lens power for vision correction. These lenses, which are also known as circular, ornamental, or "big-eye" lenses, can either change or enhance a person's eye appearance (4).

Specifications for contact lenses include the overall diameter, the base curve, the central, the optic zone diameter, peripheral, and intermediate curves, power, edge, tint and the thickness. Parameter selection should be considered before prescribing contact lenses. Base curve, which ranges in size from 8.4 to 8.9 mm, is the curvature of central back surface of contact lens. The diameter of a cosmetic contact lens is the greatest linear distance between two matching places on its edge. The optical zone, which is the refractive portion of the cosmetic contact lens center, should have a minimum diameter of 7.0 mm and a maximum diameter of 9.0 mm. The water content of cosmetic color contact lenses, which ranges from 38 to 80%, is directly related to their oxygen permeability. The flexibility, formability, durability, and optical clarity of the lens are all dependent on its thickness (5). The wettability, oxygen permeability, water content, light transmission, transmission, size, refractive index, temperature resistance, and flexural stability of contact lenses are among the characteristics that affect their performance (6)

There are many different types of contact lenses. Contact lenses that are gas permeable might be soft, firm, or rigid. Contact lenses are divided into focons and filcons based on the material. A good contact lens should have an adequate surface chemistry, be sterile, stable, moldable, and gas permeable. It should also have good optical qualities and tolerance (7).

The market for tinted contact lenses used for prosthetic purposes takes up a significant portion of the overall market for contact lenses. Aniridia, ocular albinism, leukoma, diplopia, and iris atrophies are some of the conditions that can be managed with the assistance of prosthetic lenses (8). Different configurations of prosthetic lenses can be manufactured, including those with occluded pupils and irises, clear irises, and clear pupils. There is some leeway in terms of diameters depending on the prescription. Occlusion of the pupil and iris, as well as pigmentation of the iris on the anterior surface, can be used in the production of softly tinted lenses. Patients who have permanently dilated pupils have the option of wearing lenses that occlude the iris and have front painting. Patients who have dark irises have the option of selecting a black iris occlusion lens for their prescription eyewear. Pupil-occluded lenses have a dark area in the middle that replicates the size, shape, and color of a typical pupil, and they prevent the wearer from seeing clearly (9). They can be utilized for the occlusion of vision, the camouflage of a white pupil, or the correction of esthetic flaws in an eye that is visually impaired. It's possible to get rigid or soft prosthetic contact lenses. Computer-generated printed lenses, Translucent tinted lenses and hand-painted lenses are the types of prosthetic lenses that scatter light the most effectively (2).

A decorative soft contact lens has a centre pigment-free optical zone and a periphery that is coloured with pigment. In terms of appearance, it highlights the color of the iris and gives the corneal diameter a larger appearance. The demographic information reveals that young girls make up the majority of those who wear these cosmetic contact lenses.They frequently ignore prescription, fitting, directions, and follow-up exams since they primarily wear these lenses for cosmetic reasons and do not pay attention to these factors. They buy the lenses off the shelf, from an unauthorized optical store, or from friends or family members. Poorly made ornamental coloured lenses' surface pigments in particular can make the surface rougher, which could encourage bacterial adhesion and infection (10).

It has been noted that wearing tinted soft contact lenses can impair certain aspects of eyesight, such as reducing contrast sensitivity and constricting the visual field. Even when there is good visual acuity as determined by standard visual tests, using tinted soft contacts may result in decreased vision quality (11).

Visual acuity is defined as the level of finest detail that can be detected is one of the most important visual functions. Standard visual acuity (VA), which is an excellent measure of visual function, is determined by a patient's ability to recognize familiar letters or Landolt rings with a high degree of contrast between them. Visual acuity, on the other hand, is just one component of overall visual function (12). The logMAR chart becomes the method of choice for testing visual acuity (13).

Contrast is a measurement of how light or dark an object is in relation to its surroundings. The smallest distinction-enabling difference in brightness and darkness between objects background and an object is known as the contrast threshold. The most commonly used charts for the assessment of contrast sensitivity includes pellirobson chart, VISTECH chart and lea symbol chart (14). Wearing colored soft contacts will decrease contrast sensitivity, and this decrease in contrast sensitivity may be brought on by an increase in higher-order wavefront aberrations in the eye (11).

Visual field is defined as an area that can be seen while focusing on a central point. Perimetry technique can be considered to measure the peripheral or central visual field, or both. Assessment of visual field is one of the important clinical tools in assessing the patients with acute and chronic ocular and/or neurological disease (15).

Anatomical elements like the face inferiorly, the nose nasally, and the brow superiorly limit the range of the normal visual field. It often reaches 60 degrees up, 90 degrees out, 70 degrees down, and 60 degrees in when using a white target. The extent is influenced by variables like lighting, test object size, contrast, ocular adaption condition, and pupil size. There are two categories of visual fields charts: Static refers to the measurement of retinal sensitivity at each point within the visual field, as opposed to Kinetic, which refers to the process of transporting input from the periphery to the centre. It was clear that wearing contact lenses reduces contrast sensitivity and that coloured cosmetic lenses narrow the field of view. However, there was a lack of information in the literature on the simultaneous effects of plano coloured cosmetic CL on the visual field threshold and contrast sensitivity. Colored cosmetic soft contact lenses (SCL) have iris patterns or imprints that can be used to change or enhance the look of the iris and, consequently, the cosmetic appearance. These lenses come in a variety of iris patterns, including dot-matrix, circular fringe, and others. It was clear that using contacts causes a reduction in contrast sensitivity and that coloured cosmetic lenses narrow the field of view. However, there was a dearth of information in the literature on the simultaneous effects of plano coloured cosmetic CL on the visual field threshold and contrast sensitivity (16).

Visual acuity (VA) and visual field are two clear indicators of eyesight. Contrast perception is far less frequently evaluated despite being a more accurate predictor of traffic accidents than visual acuity. Contrast sensitivity testing should either take place under photopic or mesopic settings, or both, according to the most recent version of the aforementioned regulation. Technically, contrast testing is more difficult than acuity testing, and the process is less consistent. The timing and space requirements for well-defined dark adaption, which are necessary for accurate mesopic testing, can interfere with healthcare setting (17).

The quality of vision in various lighting situations is one of the most important problems with refractive correction. According to research, contrast sensitivity (CS) tests are more reliable than visual acuity tests for determining the quality of vision. In addition, people are frequently exposed to a variety of illumination situations, such as nighttime or foggy driving, which might impair their vision. Evidence already in existence suggests that results from CS testing conducted in environments with normal lighting are insufficient. As a result, assessing CS in various illumination environments can more precisely assess a subject's level of eyesight (18, 19).

A mesopic condition causes the pupil to enlarge past the tinted contact lenses clear center. Reduced transmittance and more light scattering would result from the colored area above the pupil. Therefore, these characteristics may contribute more to the decline in vision quality in a mesopic state following the use of colored contact lenses than higher order aberrations. Another factor that could play a role in mesopic vision loss is pupil size. In terms of visual performance, it's possible that eyes with large pupils are more impacted by the colored area than eyes with tiny pupils (20).

As a result of light dispersion, the contrast of the retinal image could be diminished. The age and opacity of the ocular medium have a significant impact on the lens and cornea, two main sources of light scattering in the eye. The rate of light scattering in the eye can be impacted by the use of contact lenses as an optical surface. Due to changes in pupil size, multifocal contacts may produce visual issues like visual haloes, reduced CS, and fluctuating vision. Results from earlier research on CS changes in single focal contact lenses have been ambiguous. Clear contact lenses only experience a decrease in CS at high spatial frequencies. However, other researches have found that the only time the CS changes are seen is when colored contact lenses are worn. This study was created to look into the changes in CS caused by wearing clear and colored hydrogel contact lenses under various lighting conditions because they are the most popular forms of fitted contact lenses. This was done since the findings from earlier studies were contradictory, and it is crucial to assess visual acuity with contacts in different lighting situations (particularly in young individuals, who are the primary contact lens wearers) (21).

The reference luminance level is the luminance level (log cd.m-2) for calculating pupil diameter using the empirical relationship between pupil diameter (mm) and field brightness. When exposed to bleaching light, cons are less sensitive than rods, and this difference persists during the entire dark-adapted period. Mesopic vision is a combination of scotopic vision and photopic : it would make sense to assume that both rod and cone signals would be used in mesopic settings (22).

The average Centre clear diameter of the 234 types of cosmetic soft contact lenses that were immediately examined by consulting the Internet homepage was 6.3 mm. According to one study, participants in their twenties had nighttime pupils that were an average size of 7.1 mm. In light of this, it is hypothesized that wearing cosmetic soft contact lenses during twilight will cover the pupil, which will have an impact on visual abilities such contrast sensitivity, visual acuity and visual field. To prevent the coloured portion of the cosmetic soft contact lens from having an impact on the pupil size in a daytime photopic environment, miosis is designed to alter the amount of incident light. It is thought to be feasible (23).

OBJECTIVES

To assess contrast sensitivity, visual field and visual acuity in individuals wearing plano power cosmetic contact lenses of different optic zone diameter under mesopic conditions.

To compare contrast sensitivity, visual field and visual acuity in contact lenses of different optic zone diameter.

To assess contrast sensitivity, visual field and visual acuity in individuals with mild to moderate spherical RE wearing prescription cosmetic contact lenses of different optic zone diameter under mesopic conditions.

MATERIALS AND METHODS

3.1: Study design

A cross-sectional study design was used.

3.2: Place of study

Study was conducted at Al Nafees Medical Hospital Islamabad.

3.3: Duration of study

The study was conducted from August 2022 to May 2023.

3.4: Population of study

Cosmetic contact lens users were considered as population of this study.

3.5: Sampling technique

Non-probability Purposive sampling technique was used.

3.6: Sample size

This study was conducted on 240 eyes of 120 individuals. Participants were divided into two groups. Group A included 60 participants that were using the contact lenses with clear zone diameter of 5.5mm. Out of these 60 participants, 30 were using plano cosmetic lenses and 30 were using refractive cosmetic lenses. Group B included 60 participants that were using the contact lenses with clear zone diameter of 6.4mm. Out of these 60 participants, 30 were using plano cosmetic lenses and 30 were using refractive cosmetic lenses.

3.7: Inclusion criteria

The inclusion criteria for this study were:

- Individuals using cosmetic contact lenses of plano power
- Individuals using cosmetic contact lenses in prescription form for the correction of mild to moderate spherical refractive error. Myopia 0.50DS to 6.00DS Hyperopia +0.50DS to +3.00DS
- Individuals using freshkon and cosmetic contact lenses
- Individuals using contact lenses with clear zone diameter of 5.5mm and 6.4mm
- Individuals using these pairs of contact lenses for duration of less than one year
- Both genders were included
- With age limit minimum 18 and maximum 35 were part of this study

3.8: Exclusion criteria

The exclusion criteria for this study were:

- Individuals with high refractive error
- Dry eyes
- Glaucoma
- Media opacity
- Abnormally dilated pupils

- Retinitis pigmentosa
- Any other ocular abnormality that effect visual acuity , contrast sensitivity and visual field

3.9: Data collection instruments

Instruments that were used in this research study include:

- Log MAR (Precision vision) 4m acuity chart was used for measuring visual acuity.
- Pellirobson chart (Precision vision USA) was used for measuring contrast sensitivity.
- Goldmann kinetic perimeter (Haag streit) was used for measuring visual field.
- Pupilometer (Neuro Optics RAPIDO) was used for measuring pupil size .

3.10: Data collection tool

The data was collected using self-structured proforma.

3.11: Data collection procedure

A total of 120 patients were selected to take part in this study with age limit between 18 to 35 years. This study was carried out at Al nafees medical Hospital, Islamabad. Individuals who fulfill the inclusion criteria and who give the informed consent were included in this study.

Basic ocular examinations includes demographic data, history and visual acuity of every patients was checked using logMAR chart, contrast sensitivity using the pellirobson chart, visual field using kinetic perimetry technique and pupil diameter using pupillometer. Two groups were created out of all the study participants. Sixty patients were kept in each group. In group I those individuals were included who were using cosmetic contact lenses of various clear zone diameter of plano power. In group II individuals who were using refractive cosmetic contact lenses of various clear zone diameters were included.

The procedure beguns by applying mesopic conditions using study lamp having 0.5 watt CFL bulb. To obtain a mesopic chart luminance of 0.29 to 1 cd/m2, A spectroradiometer was used to measure the chart's brightness at three separate locations on the chart. It was discovered that this matched the mesopic brightness range utilized in earlier investigations.The individuals were asked to wear there contact lenses and after 15 minutes (an adaptation time for contact lens) contrast sensitivity, visual acuity, visual field and pupil diameter were recorded first in normal room illumination and then patients were made to sit in mesopic condition for 15 to 20 minutes again visual acuity, contrast sensitivity, visual field and pupil diameter were recorded.

The contact lenses used in this study were freshkon color fusion and freshkon mosaic lenses of 5.5mm and 6.4mm clear zone diameter respectively. Both these lenses are made up of Methafilcon A that provide excellent oxygen permeability and moisture retention for optimal comfort and eye health with a water content of 55%. These lenses have a total diameter range from 13.8mm to 14.00mm and two back optic zone radius ranges between 8.4mm to 8.6mm.

Log MAR chart was used to assess a patients visual acuity. Log MAR chart is used at a distance of 4m. By occluding one eye of the patient and asking patient to read the first letter on log MAR chart. Every letter of log MAR chart has a value of 0.02 log unit. There are five letters in each line of log MAR chart. One line of a log MAR chart has a change of 0.1 log unit. Visual acuity is recorded by noting down the line and letters read by patients without difficulty. For recording the visual acuity through this chart unread letters are added on the same line. The values of log MAR chart ranges from 1.00 to 0.0. If patient read the 0.30 line marked on chart it means his visual acuity is good compared to patient reading 0.7 line on chart.

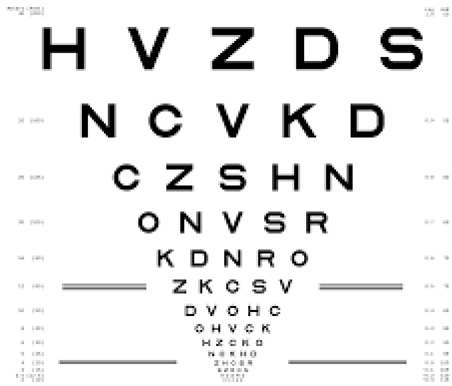

Figure 3.1 Log MAR chart.

Using a Pelli-Robson chart, contrast sensitivity was evaluated. With contrast shifting across groups of letters, The Pelli-Robson test utilises a single, big letter size (20/60 optotype) to assess contrast sensitivity. The graphic especially uses letter clusters that contrast from high to low, six per line. Until they are unable to read more than two or three letters together, patients start by reading the letters with the greatest contrast. Every contrast level has three trials, with three letters in each group having the same contrast level. Based on the contrast of the previous group, where two or three letters were correctly read, the subject is given a score. The result, which is a single number, represents the subject's log contrast sensitivity. With a contrast sensitivity of 100% or log 2, a score of 2 indicates that the individual was able to read at least two out of the three letters with a contrast of 1%. With a 2.0 Pelli-Robson score, contrast sensitivity is considered to be normal. Scores under 2.0 indicate a lower level of contrast sensitivity. When the Pelli-Robson contrast sensitivity score is less than 1.5, it indicates visual impairment, and when it is less than 1.0, it indicates visual disability.

Figure 3.2: Pellirobson chart

Visual field was measured using bernell disc perimeter. In this procedure patient one eye is covered and other eye fixates on central white dot. While fixating on central dot patient is asked to report the visibility of stimulus that is moved from periphery toward center (from 90 to 0). The subject response was confirmed by moving the wand to the blind spot (about 15 degree temporally). Occasionally the wand was turned around to hide the target during the test and the subject response was noted to check for any malingering. The results were then plotted on the recording sheet of the bernell handheld disc perimeter. This was done by joining the points at which the patient reported that the target disappeared at the particular meridian. A normal field of vision is roughly 100° temporally (laterally), 60° nasally, 60° superiorly, and 75°inferiorly.

Figure 3.3: Bernell handdisc perimeter

Tests were done under binocular conditions. The procedure used in every testing session was same: first visual acuity was assessed, subsequently with contrast sensitivity and visual field.

3.12: Data analysis method

A paired sample t-test and an independent sample t-test were used to analyze the data using the statistical package for the social sciences (SPSS) version 22.0.

3.13: Ethical consideration

Both verbal and written consent were obtained from those who participated after sufficiently informing them about the goals and the design of the study. This was done assuming adequate time to take into account all the possibilities, to make sure the people who were involved in the study will comprehend this information, to make sure they will volunteer subject matter and continue to exchange information, share information and ask questions.

RESULTS

240 participants were enrolled in the study fulfilling the inclusion criteria. Participants were divided into two groups. Group A included 120 participants that were using the contact lenses with clear zone diameter of 5.5mm. Out of these 120 participants, 60 were using Plano cosmetic lenses and 60 were using refractive cosmetic lenses. Group B included 120 participants that were using the contact lenses with clear zone diameter of 6.4mm. Out of these 120 participants, 60 were using Plano cosmetic lenses and 60 were using refractive cosmetic lenses.

4.1: Age of the Respondents

Overall, the mean age of the participants came out to be 25.71±4.48 years. The mean age of Group A (the participants were using contact lenses with clear zone diameter 5.5mm) came out to be 26.27±4.20 years. The mean age of Group B (the participants were using contact lenses with clear zone diameter 6.4mm) came out to be 25.15±4.72 years as described in table 4.1.

Table 4.1: Age of the respondents (Years).

Study Groups	Mean ± SD	Min	Max
Group A (n=120)	26.27±4.20	18	35
Group B (n=120)	25.15±4.72	18	35
Total (n=240)	25.71±4.48	18	35

4.2: Gender of participants

It was reported that overall, there were 90% (N= 216) females and 10% (N=24) males. In Group A there were 87.6% (N= 104) females and 13.3% (N= 16) males. In Group B, there were 93.3% (N=112) females and 6.7% (N=8) males as described in table 4.2 and figure 4.1.

Table 4.2: Gender distribution among groups.

Gender	Study Groups		Total
	Group A (n=120)	**Group B(n=120)**	(n=240)
Female	104(86.7%)	112(93.3%)	216 (90%)
Male	16(13.3%)	8 (6.7%)	24 (10%)

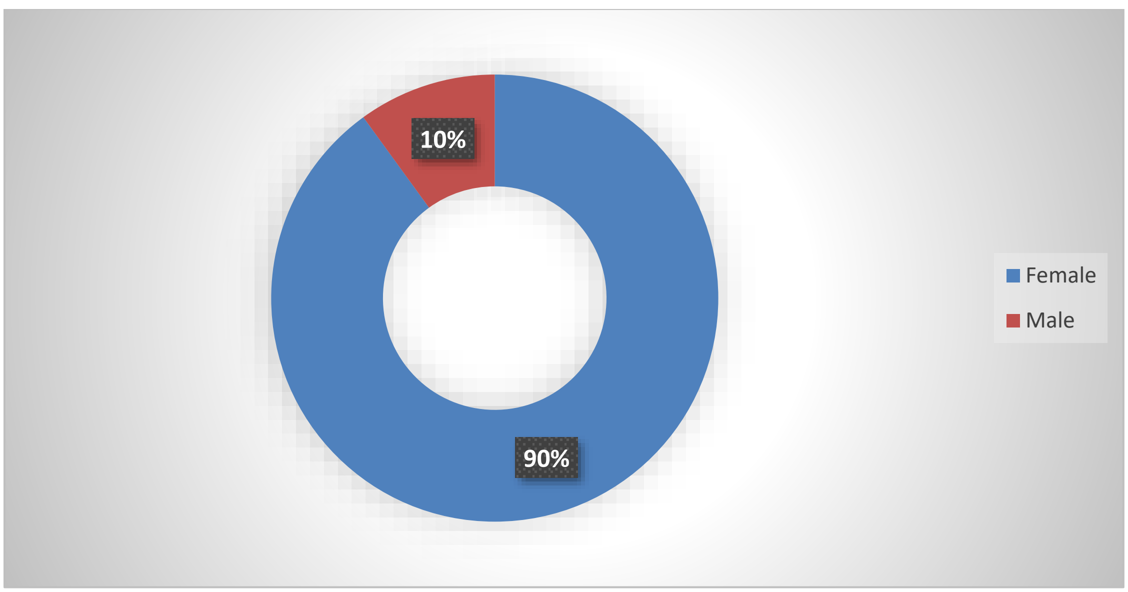

Figure 4.1: Gender Distribution.

4.3: Difficulty with contact lens use in night time driving

Overall, 38.3% (N= 92) of total participants have difficulty with contact lens in night time driving. It was reported that in Group A out of 120, 56.7% (N= 68) had difficulty with the contact lens use in the night time driving. While in Group B, 20% (N= 24) had difficulty with the use of contact lens use in night time driving as described in table 4.3 and figure 4.2.

Table 4.3: Difficulty with contact lens use in night time driving.

Difficulty with contact lens use in night time driving	Study Groups		Total (n=240)
	Group A (n=120)	Group B(n=120)	
No	44(36.7%)	42(35%)	86(35.8%)
Yes	68(56.7%)	24(20%)	92(38.3%)
Unknown	8(6.7%)	54(45%)	62(25.8%)

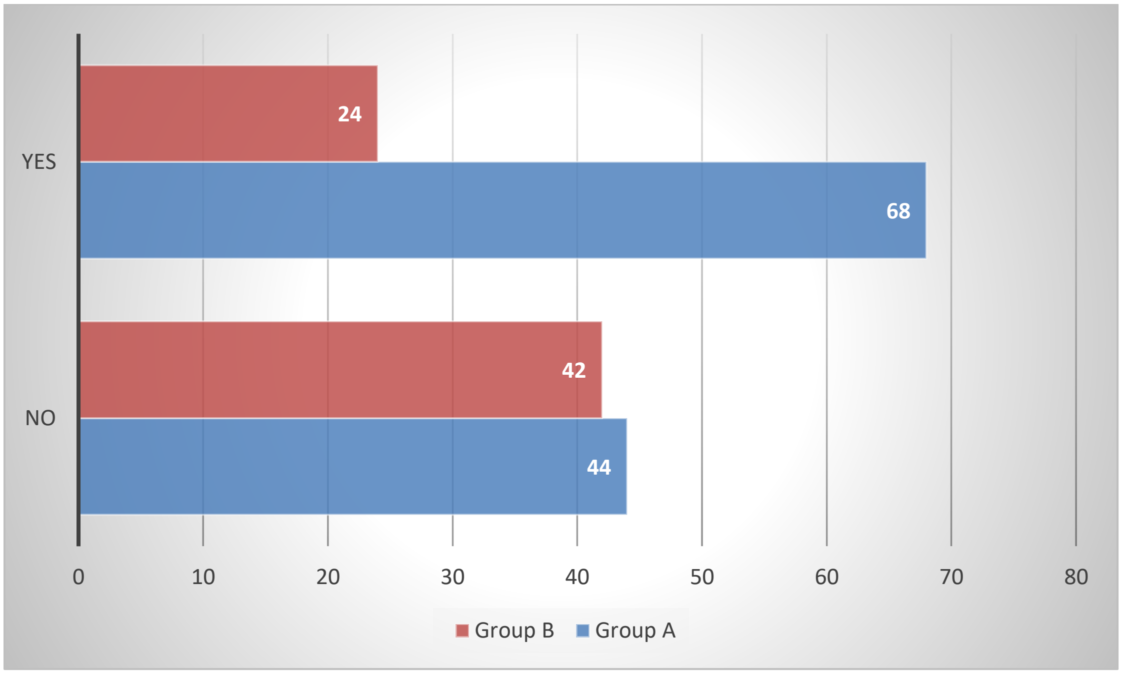

Figure 4.2: Difficulty with contact lens use in night time driving in both study groups.

4.4: Difficulty in mobility and orientation while using contact lenses

In Group A, out of 120, 61.7% (N=74) had difficulty in mobility and orientation while using contact lenses. While in Group B, only 23.3% (N= 28) reported to have difficulty in mobility and orientation while using contact lenses as described in table 4.4 and figure 4.3.

Table 4.4: Difficulty in mobility and orientation while using contact lenses.

Difficulty in mobility and orientation while using contact lenses	Study Groups		Total (n=240)
	Group A (n=120)	Group B(n=120)	
No	46(38.3%)	92(76.7%)	138(57.5%)
Yes	74(61.7%)	28(23.3%)	102(42.5%)

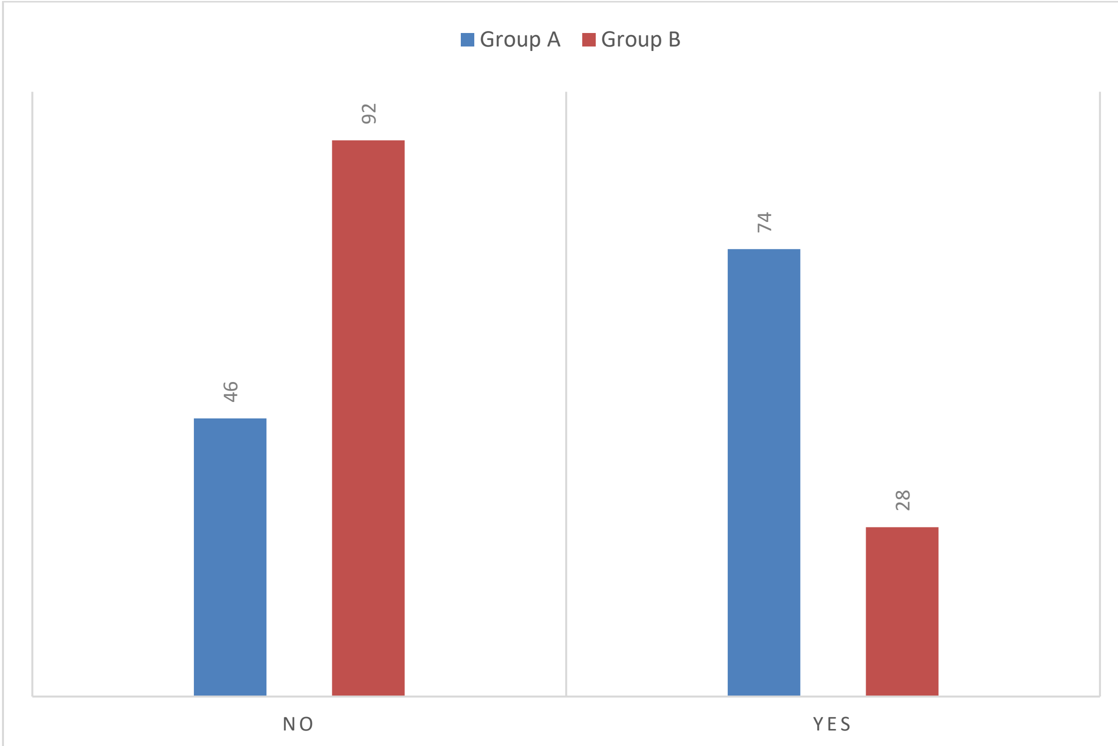

Figure 4.3: Difficulty in mobility and orientation while using contact lenses.

4.5: Difficulty in performing daily activities at night with contact lenses

In Group A, 58.3% (N=70) complained about difficulty in performing daily activities at night with contact lenses. While in Group B, 21.7% (N=26) reported to have difficulty in performing daily activities at night with contact lenses as described in table 4.5 and figure 4.4.

Table 4.5: Difficulty in performing daily activities at night with contact lenses.

Difficulty in performing daily activities at night with contact lenses.	Study Groups		Total (n=240) Group A (n=120)
	Group A (n=120)	Group B(n=120)	
No	50(41.7%)	94(78.3%)	144(60%)
Yes	70(58.3)	26(21.7%)	96(40%)

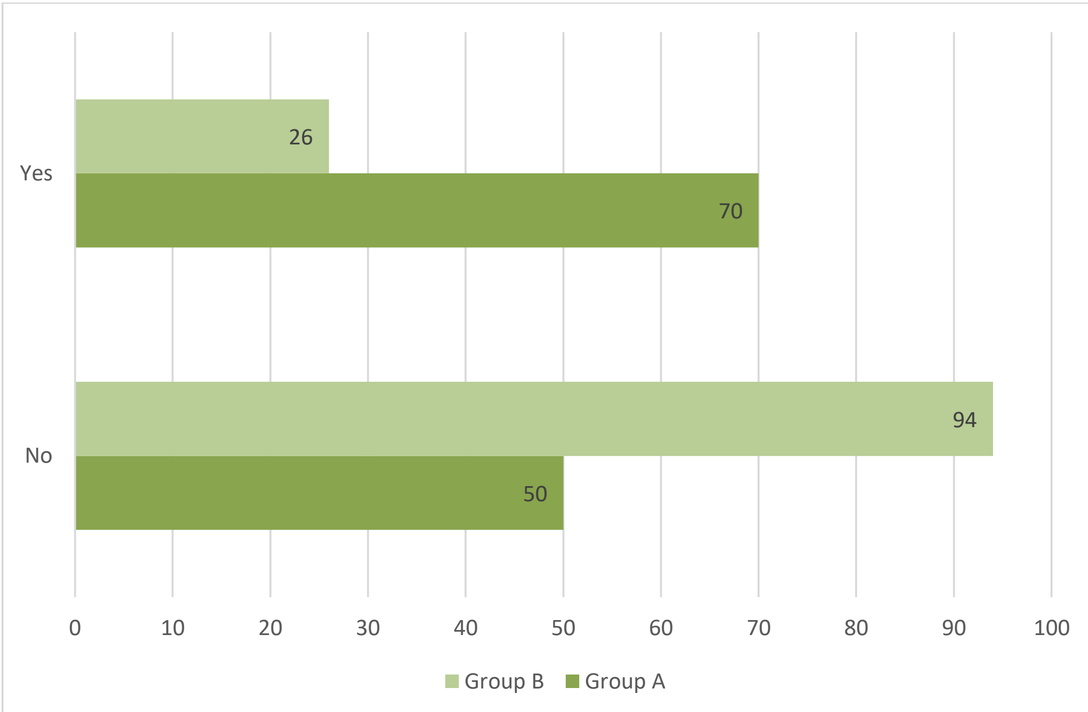

Figure 4.4: Difficulty in performing daily activities at night with contact lenses.

4.6: Pupil size under normal light and mesopic light

Overall, the mean pupil size under normal lightening conditions was 4.45±0.44 mm ranging from 3.50 mm to 5.30 mm and under mesopic lightening conditions it was 6.27±0.33 mm ranging from 5.30 mm to 6.90 mm. The mean pupil size under normal light for Group A was 4.48±0.49 ranging from 3.50 mm to 5.0 mm and under mesopic light it came out to be 6.45±0.27 ranging from 5.80-6.90. For Group B, the mean pupil size under normal lightening condition was 4.42±0.37mm ranging from 3.50 mm to 5.20 mm and under mesopic lightening it was 6.10±0.29 ranging from 5.30 mm to 6.70 mm as described in table 4.6.

Table 4.6: Pupil size under normal light and mesopic light.

Contact lens clear zone diameter (mm)		Pupil size in normal lightning conditions(mm)	Pupil size in mesopic lightning condition(mm)
Group A (n=120)	Mean	4.48±0.49	6.45±0.27
	Minimum	3.50	5.80
	Maximum	5.30	6.90
Group B (n=120)	Mean	4.42±0.37	6.10±0.29
	Minimum	3.50	5.30
	Maximum	5.20	6.70
Total (n=240)	Mean	4.45±0.44	6.27±0.33
	Minimum	3.50	5.30
	Maximum	5.30	6.90

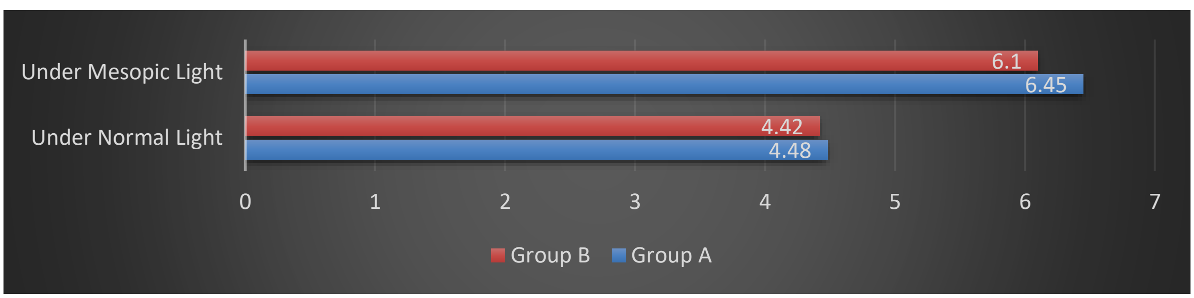

Figure 4.5: Pupil size under normal light and mesopic light.

Parametric tests were used to analyze the data as data was normal and P- value was greater than 0.05 (p>0.05).

4.7: Assessment of visual acuity under mesopic and normal light conditions within group A

Total number of participants was 120 using small clear zone diameter contact lenses of 5.5 mm label as group A. Under normal light the visual acuity came out to be 0.00± 0.00 that is accountable for normal visual acuity. Under mesopic light the mean visual acuity for group A came out to be 0.19±0.03. A visual acuity value of 0.19±0.03 would be considered relatively decreased visual acuity. Significant differences ($p<0.005$) were seen in the visual acuity under normal and mesopic light in the participants included in Group A as described in table 4.7, 4.8.

Table 4.7: Paired sample statistics of visual acuity under mesopic and normal light conditions within group A.

Paired Samples Statistics				
	Mean	N	SD	Std. Error Mean
VA under normal light	0.0000	120	0.00000	0.00000
VA in Mesopic Light	.1910	120	.03563	.00325

Table 4.8: Paired sample t-test for comparison of visual acuity under mesopic and normal light conditions within group A.

Paired Samples Test								
	Paired Differences					T	df	Sig. (2-tailed)
	Mean	SD	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
VA normal light/ VA Mesopic light	-.1910	.03563	.00325	-.19744	-.1845	-58.72	119	.000

4.8: Assessment of contrast sensitivity under mesopic and normal light conditions within group A

For group A, the contrast sensitivity under normal light came out to be 1.92± 0.97 while under mesopic light it came out to be 1.48±0.17. A contrast sensitivity value of 1.48±0.17 would be considered relatively decreased contrast sensitivity. Significant differences ($p<0.005$) were seen in the contrast sensitivity under normal and mesopic light in the participants included in Group A. as described in table 4.9, 4.10.

Table 4.9: Paired sample statistics of contrast sensitivity under mesopic and normal light conditions within group A.

Paired Samples Statistics				
	Mean	N	Std. Deviation	Std. Error Mean
CS in Normal Light	1.9263	120	.09722	.00888
CS in Mesopic Light	1.4873	120	.17407	.01589

Table 4.10: Paired Sample t-test for comparison of contrast sensitivity under mesopic and normal light conditions within Group A.

Paired Samples Test								
	Paired Differences					T	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
CS Normal Light/Mesopic Light	.43892	.20306	.01854	.40221	.47562	23.678	119	.000

4.9: Assessment of visual field under mesopic and normal light conditions within group A.

For group A, Temporal visual field under normal light came out to be 89.41±1.61degrees and under mesopic light it was 78.95±2.58 degrees. For group A, Nasal visual field under normal light came out to be 58.91±7.72degrees and under mesopic light it was 49.12± 2.64 degrees. Superior VF under normal light came out to be 58.91 ± 7.72 degrees and under mesopic light came out to be 44.16±3.96 degrees. Inferior VF under normal light came out to be 75±0.00 degrees and under mesopic light it came out to be 67.1±7.06 degrees. This indicates that visual field in all four quadrants decreases in mesopic condition in comparison to normal illumination. Significant differences were seen in the temporal visual field (P-Value=0.00), nasal visual field (P-Value=0.00), superior visual field (P-Value=0.00) and inferior visual field (P-Value=0.00), under normal and mesopic light in the participants included in Group A as described in table 4.11, 4.12.

Table 4.11: Paired sample statistics of visual field under mesopic and normal light conditions within group A.

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Temporal Visual Field Under Normal Light	89.4167	120	1.61184	.14714
	Temporal Visual Field Under Mesopic Light	78.9583	120	2.58436	.23592
Pair 2	Nasal Visual Field Under Normal Light	58.9167	120	7.72922	.70558
	Nasal Visual Field Under Mesopic Light	49.1250	120	2.64595	.24154
Pair 3	Superior Visual Field Under Normal Light	58.9167	120	7.72922	.70558
	Superior Visual Field Under Mesopic Light	44.1667	120	3.96059	.36155
Pair 4	Inferior Visual Field Under Normal Light	75.0000	120	0.00000	0.00000
	Inferior Visual Field Under Mesopic Light	67.1000	120	7.06203	.64467

Table 4.12: Paired Sample T-Test for comparison of Visual Field under mesopic and normal light conditions within Group A.

Paired Samples Test									
		Paired Differences					T	Df	Sig. (2-tailed)
		Mean	SD	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Temporal VF Normal Light/ mesopic Light	10.458	2.149	.19622	10.06981	10.84686	53.300	119	.000

Pair 2	Nasal VF normal Light/ mesopic Light	9.7916	8.2348	.75174	8.30315	11.28018	13.025	119	.000
Pair 3	Superior VF Normal Light/mesopic Light	14.750	8.1439	.74344	13.27792	16.22208	19.840	119	.000
Pair 4	Inferior VF Normal Light/ mesopic Light	7.9000	7.0620	.64467	6.62348	9.17652	12.254	119	.000

4.10: Assessment of visual acuity under mesopic and normal light conditions within group B

Total number of participants was 120 using large clear zone diameter contact lenses of 6.4 mm label as group B. The mean visual acuity under normal light came out to be 0.03± 0.04 and under mesopic light it came out to be 0.06±0.05. A visual acuity value of 0.06±0.05 would be considered relatively decreased visual acuity Significant differences were seen in the visual acuity under normal and mesopic light in the participants included in Group B (P-Value=0.00) as described in table 4.13, 4.14.

Table 4.13: Paired sample statistics of visual acuity under mesopic and normal light conditions within group B.

Paired Samples Statistics				
	Mean	N	Std. Deviation	Std. Error Mean
Visual Acuity Under Normal Light	.0300	120	.04602	.00420
Visual Acuity Under mesopic Light	.0652	120	.05870	.00536

Table 4.14: Paired sample t-test for comparison of visual acuity under mesopic and normal light conditions within group B.

Paired Samples Test								
	Paired Differences					T	df	Sig. (2-tailed)
	Mean	SD	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
VA Normal Light/Mesopic Light	-.03517	.04631	.00423	-.0435	-.02680	-8.319	119	.000

4.11: Assessment of contrast sensitivity under mesopic and normal light conditions within group B

For group B, the contrast sensitivity under normal light came out to be 1.94±0.80 and under mesopic light it came out to be 1.79±0.14. A contrast sensitivity value of 1.79±0.14 would be considered relatively decreased contrast sensitivity Significant differences were seen in the contrast sensitivity under normal and mesopic light in the participants included in Group B (P-Value=0.00) as described in table 4.15, 4.16.

Table 4.15: Paired sample statistics of contrast sensitivity under mesopic and normal light conditions in group B.

Paired Samples Statistics				
	Mean	N	SD	Std. Error Mean
Contrast Sensitivity Under Normal Light	1.9450	120	.08002	.00730
Contrast Sensitivity Under Mesopic Light	1.7963	120	.14655	.01338

Table 4.16: Paired sample t-test for comparison of contrast sensitivity under mesopic and normal light conditions within group B.

Paired Samples Test								
	Paired Differences					T	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
CS Normal Light/Mesopic Light	.14875	.13449	.01228	.12444	.17306	12.116	119	.000

4.12: Assessment of visual field under mesopic and normal light conditions within group B

For group B Temporal visual field under normal light came out to be 90.0±0.00degrees and under mesopic light it was 88.29±2.38 degrees. Nasal visual field under normal light came out to be 60 ±0.00degrees and under mesopic light it was 56.87±2.83 degrees. Superior VF under normal light came out to be 60±0.00 degrees and under mesopic light came out to be 52.91±4.56 degrees. Inferior VF under normal light came out to be 75±0.00 degrees and under mesopic light it came out to be 75.54±3.24 degrees. This indicates that visual field in all four quadrants decreases in mesopic condition in comparison to normal illumination. Significant differences were seen in the temporal visual field (P-Value=0.00). Nasal visual field (P-Value=0.00)., superior visual field (P-Value=0.00).and inferior visual field(P-Value=0.00). Under normal and mesopic light in the participants included in Group B. (P-Value=0.00) as described in table 4.17, 4.18.

Table 4.17: Paired sample statistics of visual field under mesopic and normal light conditions in group B.

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Temporal Visual Field Under Normal Light	90.0000	120	0.00000	0.00000
	Temporal Visual Field Under Mesopic Light	88.2917	120	2.38128	.21738
Pair 2	Nasal Visual Field Under Normal Light	60.0000	120	0.00000	0.00000

	Nasal Visual Field Under Mesopic Light	56.8750	120	2.83010	.25835
Pair 3	Superior Visual Field Under Normal Light	60.0000	120	0.00000	0.00000
	Superior Visual Field Under Mesopic Light	52.9167	120	4.56435	.41667
Pair 4	Inferior Visual Field Under Normal Light	75.0000	120	0.00000	0.00000
	Inferior Visual Field Under Mesopic Light	72.5417	120	3.24075	.29584

Table 4.18: Paired sample t-test for comparison of visual field under mesopic and normal light conditions within group B.

Paired Samples Test										
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Temporal VF Normal Light/Mesopic Light	1.70833	2.38128	.21738	1.27790	2.13877	7.859	119	.000
Pair 2	Nasal VF Normal Light/ mesopic Light	3.12500	2.83010	.25835	2.61344	3.63656	12.096	119	.000
Pair 3	Superior VF Normal Light /mesopic Light	7.08333	4.56435	.41667	6.25829	7.90837	17.000	119	.000
Pair 4	Inferior VF Normal Light/ mesopic Light	2.45833	3.24075	.29584	1.87254	3.04412	8.310	119	.000

4.13: Comparison of visual acuity under mesopic conditions in both study groups using plano power contact lenses

Total number of subjects were 120 among which 60 were using cosmetic plano contact lenses with central zone diameter of 5.5 mm label as group A and 60 were using cosmetic plano contact lenses with central zone diameter of 6.4 mm label as group B. Under mesopic light the mean visual acuity for group A came out to be 0.19±0.03 and for group B, the mean visual acuity came out to be 0.07±0.05. It was reported that Significant differences were observed in the visual acuity under mesopic light (P value=0.00) in both groups. P value indicates that visual acuity decreases in both groups but more decrease occurs in group A using contact lenses of 5.5 mm as described in table 4.19, 4.20.

Table 4.19: Group statistics for comparison of visual acuity in both study groups using plano power contact lenses.

Group Statistics					
	group	N	Mean	Std. Deviation	Std. Error Mean
Visual acuity in Mesopic condition	Group A(5.5 mm)	60	.1940	.03300	.00426
	Group B(6.4 mm)	60	.0733	.05818	.00751

Table 4.20: Independent sample t-test for comparison of visual acuity in both study groups using plano power contact lenses.

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Visual acuity in Mesopic condition	Equal variances assumed	54.857	.000	13.974	118	.000	.12067	.00864
	Equal variances not assumed			13.974	93.394	.000	.12067	.00864

4.14: Comparison of contrast sensitivity under mesopic conditions in both study groups using plano power contact lenses

The contrast sensitivity under mesopic light came out to be 1.49±0.15 for group A and under mesopic light it came out to be 1.79±0.17 for group B. It was reported that Significant differences were observed in the contrast sensitivity under mesopic light (P value=0.00). P value indicates that contrast sensitivity decreases in both groups but more decrease occurs in group A using contact lenses of 5.5 mm as described in table 4.21, 4.22.

Table 4.21: Group statistics for comparison of contrast sensitivity in both study groups using plano power contact lenses.

Group Statistics					
	Group	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Contrast sensitivity in mesopic condition	Group A(5.5 mm)	60	1.495	0.15451	0.01995
	Group B(6.4 mm)	60	1.7875	0.16637	0.02148

Table 4.22: Independent sample t-test for comparison of contrast sensitivity in both study groups using plano power contact lenses.

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Contrast sensitivity in mesopic condition	Equal variances assumed	.403	.527	-9.979	118	.000	-.29250	.02931
	Equal variances not assumed			-9.979	117.360	.000	-.29250	.02931

4.15: Comparison of visual field under mesopic light conditions in both study groups using plano power contact lenses

For group A, Temporal visual field under mesopic light came out to be 78.50±2.48 degrees, Nasal visual field under mesopic light came out to be 49.00 ± 2.73 degrees, Superior VF under mesopic light came out to be 44.83±3.90 degrees, Inferior VF under mesopic light came out to be 67.08±3.93 degrees. For group B, Temporal visual under mesopic light was 87.91±2.48 degrees, Nasal visual field under mesopic light was 56.33±3.03 degrees, Superior VF under mesopic light came out to be 53.50±4.14 degrees, Inferior VF under mesopic light it came out to be 72.00±3.34 degrees. Significant differences were observed in terms of temporal visual field of both study groups under the mesopic light (P value=0.00), nasal visual field of both the groups under mesopic light (P Value=0.00), superior visual field of both the groups under mesopic light (P Value=0.00) and inferior visual field of both the groups under mesopic light (P Value =0.00). P value indicates that visual field decreases in both groups but more decrease occurs in group A using contact lenses of 5.5mm as described in table 4.23, 4.24.

Table 4.23: Group statistics for comparison of visual field in both study groups using plano power contact lenses.

	Groups	N	Mean	Std. Deviation	Std. Error Mean
Temporal VF Mesopic Condition	Group A(5.5 mm)	60	78.5000	2.48726	.32110
	Group B(6.4 mm)	60	87.9167	2.48584	.32092
Nasal VF Mesopic condition	Group A(5.5 mm)	60	49.0000	2.73087	.35255
	Group B(6.4 mm)	60	56.3333	3.03464	.39177
Superior VF Mesopic condition	Group A(5.5 mm)	60	44.8333	3.90205	.50375
	Group B(6.4 mm)	60	53.5000	4.14770	.53547
Inferior VF Mesopic condition	Group A(5.5 mm)	60	67.0833	3.93718	.50829
	Group B(6.4 mm)	60	72.0000	3.34461	.43179

Table 4.24: Independent sample t-test for comparison of visual field in both study groups using plano power contact lenses.

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Temporal VF mesopic Condition	Equal variances assumed	2.017	.158	-20.743	118	.000	-9.41667	.45398
	Equal variances not assumed			-20.743	118.000	.000	-9.41667	.45398

Nasal VF Mesopic condition	Equal variances assumed	2.110	.149	-13.914	118	.000	-7.33333	.52705
	Equal variances not assumed			-13.914	116.711	.000	-7.33333	.52705
Superior VF Mesopic condition	Equal variances assumed	1.238	.268	-11.788	118	.000	-8.66667	.73518
	Equal variances not assumed			-11.788	117.563	.000	-8.66667	.73518
Inferior VF Mesopic condition	Equal variances assumed	1.294	.258	-7.372	118	.000	-4.91667	.66693
	Equal variances not assumed			-7.372	114.994	.000	-4.91667	.66693

4.16: Comparison of visual acuity under mesopic conditions in both study groups using refractive cosmetic contact lenses

Total number of subjects were 120 among which 60 were using cosmetic refractive contact lenses with central zone diameter of 5.5 mm label as group A and 60 were using cosmetic refractive contact lenses with central zone diameter of 6.4 mm label as group B. Under mesopic light the mean visual acuity for group A came out to be 0.18±0.03 and for group B, the mean visual acuity came out to be 0.05±0.05. It was reported that Significant differences were observed in the visual acuity under mesopic light (P value=0.00) in both groups. P value indicates that visual acuity decreases in both groups but more decrease occurs in group A using contact lenses of 5.5 mm as described in table 4.25, 4.26.

Table 4.25: Group statistics for comparison of visual acuity in both study groups using refractive cosmetic contact lenses.

Group Statistics					
	Study groups	N	Mean	Std. Deviation	Std. Error Mean
Visual acuity in Mesopic condition	Group A(5.5 mm)	60	.1880	.03813	.00492
	Group B(6.4 mm)	60	.0570	.05855	.00756

Table 4.26: Independent sample t-test for comparison of visual acuity in both study groups using refractive cosmetic contact lenses.

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Visual acuity in Mesopic condition	Equal variances assumed	65.738	.000	14.523	118	.000	.13100	.00902
	Equal variances not assumed			14.523	101.49	.000	.13100	.00902

4.17: Comparison of contrast sensitivity under mesopic conditions in both study groups using refractive cosmetic contact lenses

The contrast sensitivity under mesopic light came out to be 1.47±0.19 for group A and under mesopic light it came out to be 1.80±0.12 for group B. It was reported that Significant differences were observed in the contrast sensitivity under mesopic light (P value=0.00). P value indicates that contrast sensitivity decreases in both groups but more decrease occurs in group A using contact lenses of 5.5 mm as described in table 4.27, 4.28.

Table 4.27: Group statistics for comparison of contrast sensitivity in both study groups using refractive cosmetic contact lenses.

Group Statistics					
	Study group	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Contrast sensitivity in mesopic condition	Group A(5.5 mm)	60	1.4797	.19268	.02487
	Group B(6.4 mm)	60	1.8050	.12443	.01606

Table 4.28: Independent Sample t-test for comparison of contrast sensitivity in both study groups using refractive cosmetic contact lenses.

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Contrast sensitivity in mesopic condition	Equal variances assumed	14.561	.000	-10.987	118	.000	-.32533	.02961
	Equal variances not assumed			-10.987	100.921	.000	-.32533	.02961

4.18: Comparison of visual field under mesopic light conditions in both study groups using refractive cosmetic contact lenses

For group A, Temporal visual field under mesopic light came out to be 79.41±2.61 degrees, Nasal visual field under mesopic light came out to be 49.25 ± 2.57degrees, Superior VF under mesopic light came out to be 43.50±3.93 degrees, Inferior VF under mesopic light came out to be 67.11±9.22degrees. For group B, Temporal visual under mesopic light was 88.66±2.22 degrees, Nasal visual field under mesopic light was 57.41±2.51 degrees, Superior VF under mesopic light came out to be 52.33±4.91 degrees, Inferior VF under mesopic light it came out to be 73.08±3.06 degrees. Significant differences were observed in terms of temporal visual field of both study groups under the mesopic light (P value=0.00), nasal visual field of both the groups under mesopic light (P Value=0.00), superior visual field of both the groups under mesopic light (P Value=0.00) and inferior visual field of both the groups under mesopic light (P Value =0.00). P value indicates that visual field decreases in both groups but more decrease occurs in group A using contact lenses of 5.5 mm as described in table 4.29, 4.30.

Table 4.29: Group statistics for comparison of visual field in both study groups using refractive cosmetic contact lenses.

Group Statistics					
	Study Groups	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Temporal VF Mesopic Condition	Group A(5.5 mm)	60	79.4167	2.61865	.33807
	Group B(6.4 mm)	60	88.6667	2.22974	.28786
Nasal VF Mesopic condition	Group A(5.5 mm)	60	49.2500	2.57514	.33245
	Group B(6.4 mm)	60	57.4167	2.51970	.32529
Superior VF Mesopic condition	Group A(5.5 mm)	60	43.5000	3.93808	.50840
	Group B(6.4 mm)	60	52.3333	4.91165	.63409
Inferior VF Mesopic condition	Group A(5.5 mm)	60	67.1167	9.22431	1.19085
	Group B(6.4 mm)	60	73.0833	3.06590	.39581

Table 4.30: Independent sample t-test for comparison of visual field in both study groups using refractive cosmetic contact lenses.

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Temporal VF Mesopic Condition	Equal variances assumed	.449	.504	-20.833	118	.000	-9.25000	.44402
	Equal variances not assumed			-20.833	115.076	.000	-9.25000	.44402
Nasal VF Mesopic condition	Equal variances assumed	8.085	.005	-17.558	118	.000	-8.16667	.46512
	Equal variances not assumed			-17.558	117.944	.000	-8.16667	.46512
Superior VF Mesopic condition	Equal variances assumed	4.600	.034	-10.869	118	.000	-8.83333	.81274
	Equal variances not assumed			-10.869	112.675	.000	-8.83333	.81274
Inferior VF Mesopic condition	Equal variances assumed	6.480	.012	-4.755	118	.000	-5.96667	1.25491
	Equal variances not assumed			-4.755	71.878	.000	-5.96667	1.25491

DISCUSSION

The study has focused on comparing the contrast sensitivity, visual field and visual acuity in contact lenses of different optic zone diameter under mesopic conditions.

In 2021 Muhaimeed conducted a research following transepithelial photorefractive keratectomy, high order aberrations are affected by the optical zone ablation sizes. The study findings indicated that eyes subjected to a 6.5-mm optical zone of ablation exhibited higher levels of HOAs compared to those with a 7-mm optical ablation zone. Furthermore, the correlation between the optical zone diameter and HOAs was influenced by the pupillary diameter. It is worth noting that patients who underwent refractive surgeries with smaller diameter optical zone ablation commonly reported issues related to night driving and contrast sensitivity (24). The consequences of the current study also revealed that group A which had used smaller optic zone diameters have face more difficulty while night time driving (56.7%) as compared to group B (24%). The above mentioned research and the current study demonstrate a similar relationship between the size of the optical zone and complaints of night driving.

Each subject had a similar size pupil in both their right and left eyes. The three lighting situations showed substantial differences ($P < 0.001$), with the mean and standard deviation of pupil diameters being 3.03 ± 1.09 mm in normal light, 5.28± 0.94 mm in mesopic light, and 1.56 ± 0.59 mm in glare (24). In the current study the mean pupil size under normal lightening conditions was 4.45±0.44 mm and under mesopic lightening conditions it was 6.27±0.33 mm. Due to this change in pupil size under mesopic condition, When small clear zone diameter contact lenses are worn in mesopic state, high order aberrations are increased because the tinted component of the cosmetic lens covers the pupil. These aberrations will cause reduction in visual functions. The findings of the study mentioned above align with and support the results of the current research.

A study was conducted in 2016 by Jung to examine how wearing decorative soft contact lenses with various pigment-free optical zone diameters affected visual functioning. The 30 eyes of 30 participants in this prospective trial were used. Higher-order aberrations (HOAs) and contrast sensitivity were evaluated after wearing clear lenses and colored lenses with different pigment-free optical zone widths (4, 5 and 6 mm). The results showed that the contrast sensitivity was dramatically reduced with the smaller pigment-free optical zone diameters under photopic and mesopic circumstances (p 0.001) (20). In the current study the contrast sensitivity for a small clear zone diameter falls from 2.00

log unit to 1.49±0.15 log unit, and for a 6.4 mm clear zone diameter, it falls to 1.79±0.17 log unit. In mesopic conditions, there were obvious changes in the contrast sensitivity between various clear zone diameters. The study's findings complement those of above mentioned research investigations and are in support with them.

Sung conducted a study in 2018 on how people using cosmetic soft contact lenses see objects under mesopic settings. We examined the pupil size, shielded pupil size in each coloured lens zone, temporal visual field and visual acuity in 30 patients who had worn clear or cosmetic SCLs with various clear-zone diameters (5.2 mm and 6.4 mm) in mesopic settings. Significant differences were found between the visual acuity, temporal visual field among both groups using different optic zone diameters. A study revealed that wearing cosmetic soft contact lenses (SCLs) had negative effects on visual acuity and temporal visual field. This was accompanied by an increase in pupil size. The deterioration in visual function was more pronounced in individuals using cosmetic SCLs with smaller central clear zone diameters. Statistically significant differences were observed between individuals wearing cosmetic SCLs with a 5.2 mm clear zone diameter and those wearing clear SCLs (25). In the current study it is also observed that wearing contact lenses with small clear zone diameter of 5.5 mm have negative effect on visual acuity ($p < 0.001$) temporal, superior, inferior, and nasal visual field ($p<0.001$) in mesopic condition as compared to contact lens with large clear zone diameter of 6.4 mm. When worn in mesopic conditions, the tinted lens zone of the cosmetic SCLs covered dilated pupils, leading to a decrease in visual function. Based on these findings, it is strongly recommended that opticians discuss the potential disadvantages of wearing cosmetic SCLs at night with their customers.

5.2: Conclusion

- The study's conclusion suggests significant differences in visual acuity, visual field and contrast sensitivity when different optic zone diameters were used under both normal and mesopic lighting conditions
- Visual acuity, visual field and contrast sensitivity were considerably decreased when wearing contact lenses with a 5.5 mm clear zone diameter in comparison to

contact lenses with 6.4 mm clear zone diameters. This shows that contact lens with smaller central zone diameter will have more negative impact on visual functions than large central zone diameter.

- The results of this study show that when wearing contact lenses with small central zone diameters under mesopic settings, those who use plano power contact lenses and refractive cosmetic lenses exhibit almost an identical decline in visual acuity, contrast sensitivity, and visual field.
- According to the study's findings, people who use contact lenses with a small central zone diameter find it more challenging to drive at night than those who wear lenses with a wide central zone diameter.
- Additionally, those who wear contacts with small central zone diameter have trouble moving around and orienting themselves at night compared to those who use lenses with a large central zone diameter.
- This study also concluded that individuals who use contact lenses with a small central zone diameter have difficulty in performing daily activities at night than those who wear lenses with a wide central zone diameter.
- This suggests that the size of the optic zone, which refers to the portion of the contact lens that corrects vision, plays a crucial role in determining visual performance. The results emphasize the need to consider optic zone diameter as a critical factor when evaluating and selecting contact lenses.

5.3: Limitations

- One of the study's limitations is a lack of patient cooperation because it takes about 45 minutes to complete the data collection procedure.
- Another limitation is the difficulty in locating patients who were using contact lenses with a tiny clear zone diameter, which makes it difficult to collect data.
- It should be noted that since just one type of tinted contact lenses from one manufacturer (freshkon lenses) were used in this study, only these lenses may be used to interpret the findings.

5.4: Recommendations

- As visual acuity, visual field and contrast sensitivity reduces more in small optic zone diameter, this could help provide specific guidelines for practitioners when selecting contact lenses for patients.
- This study recommend individuals who wear contact lenses in low light conditions to take into account the central zone's diameter because failing to do so will increases the risk of major accidents.
- This study will contribute to the recommendation that contact lens practitioners examine pupil diameter before prescribing contact lenses since a dilated pupil will result in the tinted component of cosmetic contact lenses covering the pupil, which will impair visual functions.
- The current investigation probably gave us some ideas about the direct impacts of central zone diameters and lighting conditions on visual performance. To assess these elements' long-term effects, it would be beneficial to undertake longitudinal research. Knowing how visual acuity, contrast sensitivity, and visual field change over time may be useful in identifying any potential modifications or adaptations that take place in addition to the initial findings.
- There is a need to enhance patient education and awareness regarding the effects of different lighting conditions and optic zone diameters on visual performance. Conducting studies on patient preferences, satisfaction, and understanding of these factors could help in tailoring educational materials and communication strategies to effectively inform patients about the potential implications of their contact lens choices.

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