



## Comparative Efficacy of Different Types of Filters In Improving Visual Functions In Albinism.

### A Author's Affiliation

Ayesha Majeed

Ayesha Saleem

Correspondence Author:

Correspondence to:  
**Ayesha Majeed**  
 Optometrist

**Purpose:** The purpose of this study was to find out the most effective filter in albinism patient for enhancing their contrast and reducing their glare and to find out the improvement in visual status of albinism patients after their management with filters.

**Methods:** A total of 30 albinism patients were selected and they were checked with three filters amber filter, light grey and medium grey filter which were selected for this study. During data collection three visual functions (visual acuity, contrast and glare) were tested with and without these filters. The study was conducted within three months.

**Major Outcome:** All the three visual functions (visual acuity, contrast and glare) were improved with light grey filter only.

**Results:** In 80% of albinism patients visual acuity was improved with light grey filter. 20% show the same visual acuity but the level of comfort is raised. With light grey filter 20% shows very good contrast and 66.7% show very poor to moderate level of contrast sensitivity. For glare reduction all patients chose the light grey filter, and it shows highly significant results statistically in reduction of glare.

**Conclusion:** Both (ocular albinism OA, and oculocutaneous albinism OCA) shows same ocular effects with these filters because ocular features in both these types are almost same they only differ in severity of their symptoms. Among amber, light grey and mid grey filters all albino patients prefer light grey filter in improving visual acuity, enhancing contrast and reduction in their glare. So effectiveness of light grey filter is much better and significant in albinism than any other filter.

**Key words:** Albinism, Visual Acuity, Glare Sensitivity, Contrast Sensitivity, Filters.



## Introduction:

Albinism is derived from a Latin word *albus* meaning white<sup>1</sup>, is a group of genetic disorder which affects the biosynthesis pathway of melanin and melanin pigment formation is reduced or absent in skin eyes and hair, this reduced pigmentation in eyes results in an increased transmission of light via iris and more reflection of light through the fundus<sup>2</sup>.

Sir Archibald Garad<sup>3</sup> was the first person who identified albinism accurately and wrote about it in his scientific paper in 1908. In United States approximately one in 18000 people have albinism<sup>4</sup>. Clinically albinism presents with pigmentation abnormality of the hair, skin or eyes. According to molecular genetics there are different genes causing albinism. Recent classification is based on the affected gene, making the formerly used terms complete or partial and tyrosinase positive or negative outdated.<sup>5</sup> Forms of albinism which results from mutations in some other genes is now referred as tyrosinase unrelated albinism.<sup>6</sup>

Visual functions of a person having any type of albinism are drastically affected including visual acuity which is severely reduced. Astigmatism is most common across all the subtypes while there is high frequency of myopia and hyperopia is observed among them. Hall mark of albinism is they have to face both outdoor and indoor glare problem. Other visual functions which are adversely affected in albinism patients are glare sensitivity and contrast problems. By stray light of glare luminance is decreased and thus target visibility and contrast is also reduced. Colored optical filters used for the protection of retina, lens and other ocular structures against the damaging effects of UV light and quality of vision is improved by them. Filters allow only selective transmission of light while remaining light is blocked.

Absorptive filters are mostly used in low vision, they are used for the enhancement of contrast and reduction in glare and UV light is eliminated through them<sup>7</sup>. These tinted lenses are frequently used by practitioners to assist low vision patients of different diseases like RP, ARMD and albinism<sup>8</sup> and facilitate their patients by improving their residual vision and enhancing their contrast.

## Materials and Methods:

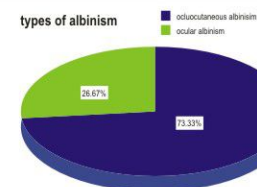
**Study Design:** It was a cross-sectional descriptive study. The study was conducted within three months.

**Data Collection:** After finalizing the sample size all the information required for the study was collected through self-designed Proforma after taking the consent from all albinism patients.

## Results:

Out of thirty patients of albinism 8 (26.6%) were with ocular albinism and 22 (73.33%) were with oculocutaneous albinism.

Visual Acuity	Frequency	Percent
Improved	24	80.0
Not improved	6	20.0
Total	30	100.0



Visual acuity with amber filter was checked and it shows overall reduction of visual acuity. In 53.3% patient's visual acuity was reduced by some letters of best corrected visual acuity. In 40% patient's reduction in visual acuity occurred to one line. And only 6.7% shows same VA. This reduction in VA was significant ( $p=0.006$ ).

Among all three filters improvement in visual acuity occurred only with light grey filter and this improvement is in 80% patients. Only 20% shows same visual acuity but in these albinism patients level of comfort is raised to some extent. These results are also statistically highly significant with  $p$  values 0.001.

	Frequency	Percent
Poor (10%)	4	13.3
Moderate (5%)	20	66.7
Very good (2.5%)	6	20.0
Total	30	100.0

Contrast sensitivity with light grey filter in 20% albino patients was very good (2.5%) while in 66.7% patients contrast remain in moderate limit (5%), which is very good (on LEA NO. contrast sensitivity chart) as they have very poor contrast first and contrast improved to significant level statistically 0.001. Contrast sensitivity with mid grey filter remains reduced in albinism patients. 73.3% patients have very poor contrast (25%), while 26.7% poor contrast (10%) on Lea No. chart statistically this reduction in glare is significant with  $p$  value 0.011.

Glare is only reduced in light grey filter and this reduction of glare is 100% and these results are highly

significant with p values 0.000. Glare with amber and mid grey filter is completely defective and this study shows defective glare in 100% albino patients.

#### Discussion:

This study on the comparative efficacy of different types of filters improving visual functions in albinism revealed that patients with albinism are more comfortable with light grey filter in context of their visual functions (visual acuity, contrast sensitivity and glare) relating problem. Patients with ocular albinism were 27.67% and with oculocutaneous albinism were 73.3%. The ocular effects in both these types were almost same, as albinism is a vision threatening pathology so visual acuity of all of the patients with albinism in this study were compromised and best corrected visual acuity was less than 6/30 and noticeable refractive error with astigmatism.

Colored lenses and filters are frequently used to protect retina, lens and other ocular structures against the UV light damaging effects and they provide better quality of vision. Among the three filters (amber, light grey and mid grey) visual function improvement occurred with light grey filter. In 80% of the patients both with ocular and oculocutaneous albinism improvement in visual acuity occurred while remaining 20% shows no improvement in visual acuity but patients reported that their level of comfort was significantly raised as filters cutoff the short wavelength light. In the same way contrast sensitivity with light grey filter in 20 to 67 percent patients shows very good improvement in contrast.

Glare was also checked and glare reduction occurred only with light grey filter and all albinos appreciated light grey filter among these three filters.

With amber filter visual acuity reduced in 93.3 and only 6.7% shows the same visual acuity. Contrast sensitivity was not significantly improved with amber filter. And glare was still defective with it.

Mid grey filter shows 96.6% significant reduction in visual acuity and contrast sensitivity was also poor in 73.3%. And for glare reduction patient prefer light grey filter only. Measurement of visual functions of albinism patients is not just a clinical measurement in low vision clinic, but it is a psychological situation because these patients are told before coming that as albinism is a hereditary disorder so their vision can not further cured and helped, they thought that they have to live with disability and sense of deprivation throughout the life. Some patients do not want examination because it is so depressing that they can not see properly. So we need to have positive attitude and should have to counsel them in a proper way so that they can use their residual vision in a best way and enhanced it with low vision optical and non optical devices and live as a disability free life in a comfortable way.

After this study it is recommended that:

- For improved and comfortable visual acuity light grey filter should be prescribed in albinism patients.
- Optometrist should advise them light grey filter as a contrast enhancement aid.
- For glare reduction light grey filter should be advised to them as it result significant glare reduction in albinism patients.

#### Conclusion:

Relative effectiveness of filters was checked in albinism. Both (OA, OCA) shows same ocular effects with these filters because ocular features in both these types are almost same they only differ in severity of these symptoms. Among amber, light grey and mid grey all albino prefer light grey filter in improving visual acuity enhancing contrast and reduction in glare. So effectiveness of light grey filter is much better and significant in albinism than any other filter.

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