

Study the effect and reduce the intensity of yellow light illumination in complete darkness on the driver's eye

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Abstract

A study and evaluation of the impact of yellow light on drivers' eyes in total darkness. to research the impact of yellow light on the driver's eye when driving at night, identify the appropriate fix for this issue, and lessen the likelihood that difficulties may arise. 100 male patients from Dhi Qar city, aged 20 to 70, were enrolled in the study. Their information was measured, as well as the refractive error of their wrist. Headaches, blurred vision, eye redness, and ignoring routine eye exams are among the rest they experience. The severity assessments ranged in age, exposure to yellow light, and severity (from mild to severe). Temporary blindness was the most perilous of these. The treatment began to reduce the symptoms associated with the effect of yellow light through a yellow filter sight that reflects yellow light (four models were taken from the Iraqi market and examined and determined which is the best in terms of radiation absorption in order to reduce the effect of light on the eye) and reduce the glare of the headlights of the car.

Keywords: yellow light, darkness on motorists & filter spectacle.

دراسة تأثير شدة الاضاءة للضوء الاصفر في الظلام الدامس للسائقين

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الخلاصة

تم دراسة وتقييم تأثير الضوء الأصفر على العيون في الظلام الدامس على سائقي السيارات في ذي قار وشملت الدراسة مجموعه ل 100 مريض من الذكور، تراوحت أعمارهم بين 20 إلى 70 عامًا. تم قياس اخطاء انكسار العين لهم وأخذ معلوماتهم وتسجيلها. حيث وكانت من أهم المشاكل التي يعانون منها الصداع، وعدم وضوح الرؤية، واحمرار العين، وإهمال الفحص الدوري للعين تفاوتت نسب المخاطر من بسيطة إلى خطيره، وهذا يعتمد على شدة الأعراض والعمر. كان أخطارها العمى المؤقت، بدأ العلاج لتقليل الأعراض المصاحبة لتأثير الضوء الأصفر من خلال تحديد واختيار نظاره المرشح الأصفر الذي يعكس الضوء الأصفر ويقلل من وهج المصابيح الأمامية للسيارات

الكلمات المفتاحية : الضوء الأصفر، مرشحات الضوء الأصفر وشدة الضوء.

Introduction

Over the use of energy-absorbing techniques, we had reasonably successful in reducing injuries to car occupants during the past three decades [1]. When asked why an accident occurred, drivers frequently respond that they saw the other road user too late to avoid a collision. The primary mistake made by drivers—failing to see another road user in time—why it happens, and how it may be prevented [1]. Without detection, no information is processed and no decision, including that of the road user, is taken, which results in a fundamental inaccuracy in detection. One of the more significant causes of detection mistake is a cognitive expectancy gap manifested by a failure to scan for a certain category of road users or to stare in the proper direction. A difficulty with perceptual thresholds can be seen in the inability of road users to discern important cues in low-light conditions or when cars are approaching in their peripheral vision [1]. Although it is rather common, photophobia is not well understood. The cause of the allergy is frequently unknown, and it can range in severity from mild to severe. photophobia, light hurts or bothers eyes. wear goggles more often [2]. Chronic dry eyes and photophobia are usually related. In fact, a review conducted by experts revealed that dry eyes are the most common cause of light sensitivity in adults. Papers on photophobia from a reliable source. The most common neurological cause was migraine [3].

Electromagnetic energy that falls inside a particular region of the electromagnetic spectrum is referred to as light. Visible light, which can be seen by the human eye and is necessary for vision, is frequently referred to by this name [4]. Visible light is typically classified as having wavelengths in the 400–700 nm range,

between infrared and ultraviolet. Humans are capable of producing light. Lighting systems that convert electrical energy into light are commonly used to generate artificial light.

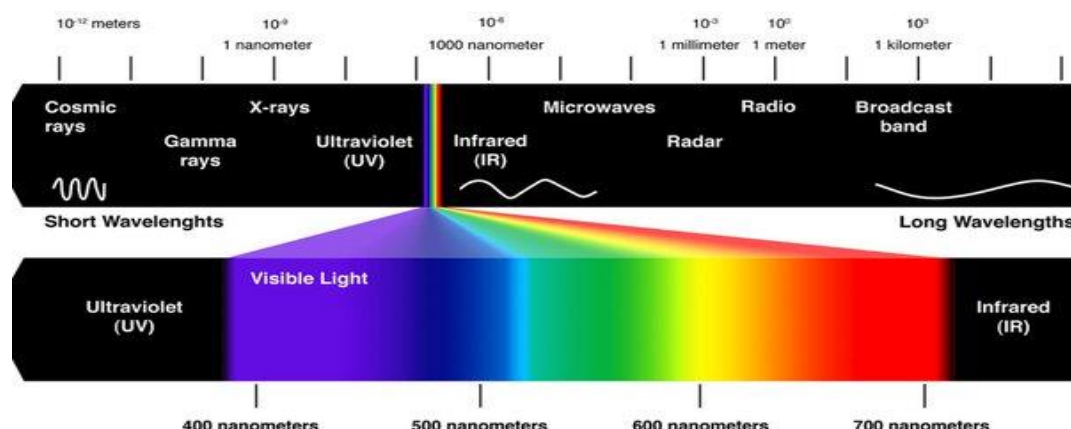


Fig. (1-1): Spectrum of Light [4]

In addition, automobile lighting Yellow has a wavelength ranging from 560 nm to 590 nm, which has an influence on drivers. The human eye is a delicate organ. It can essentially operate nonstop for an entire day [4] The region of the electromagnetic spectrum that is visible to the human eye is known as the visible spectrum. Visible light is the term for electromagnetic energy with these wavelengths. Wavelengths between 400 and 750 nm will cause a typical human eye to react. Although numerous researches have shown a preference for yellow lenses, there hasn't been much progress in figuring out the clinical importance of this feature. When seeing bright things against a blue background, such as the sky, yellow lens damage increases contrast. The contrast of the objects above is enhanced by the selective short-wavelength light suppression provided by yellow lenses [5]. Yellow filter glasses are specialized eyewear that may improve your nighttime driving vision. Typically, they are yellow. They frequently have yellow filters or anti-reflective coatings, as well as certain other polarized glasses. In low light, many people, especially the elderly, have weak vision. At 50, you could require twice as much light to see anything as you did in your 30s. Additionally, other ailments like cataracts may make it more challenging to see at night as you age [6].

*Symptoms are:

- 1 - Blurred vision.
- 2 - Dry eyes.
- 3-Eye irritation.
- 4 - Headache or eye strain ... etc. (7)

Yellow is the light between green and orange on the spectrum of visible light. It is evoked by light with a dominant wavelength of rough 575–585 nm. It is a primary color in subtractive color systems, used in painting or color printing, yellow is a secondary color made by combining red and green at equal intensity [8-9]. In recent years, consideration of human color visual sensitivity has led to changes in the long-standing practice of painting emergency vehicles, Although the color is intended for the vehicles to be easily seen and responded to, the wavelength distribution is not highly visible at low light levels [10]. The human eye is much more sensitive to yellow-green or similar hues, particularly at night, and now newest emergency vehicles are at least partially painted a vivid yellowish green or white, often [11].

Materials and Methods

A cross-sectional study in the city of Dh i Qar, from the (12/25/2021 to 5/20/2022), the sample is non -random include available (100) cases. refractive error was checked by:

A-1 - The Snellen chart: usually shows 11 rows of capital letters. The first line has one very large letter. Each row after that has increasing numbers of letters that are smaller in size. standing 6 m away

from the Snellen chart, and reading from it without your glasses or contacts. cover one eye and (covering out the smallest line of letters you can see. Then you cover the other eye and do it again. In some offices, you view the chart through a mirror. This means the test can be done with less than 6mm of space. The results are the same whether or not a mirror is used.



Fig. (3-1): The Snellen chart [12]

2– Retina scope is the use to measure a patient’s refractive error. Retinoscopy is an objective method of refraction in which the patient does not need to tell the practitioner how they see. If instead they ask the patient questions about how she/ he sees, that is called subjective refraction.



Fig. (3- 2): retina scope [12].

3-Lens meter

A- foci meter is used to measure the vertex power of a lens, green light is used to eliminate chromatic aberrations, it is portable and Measures ranges up to +20D to -20D.

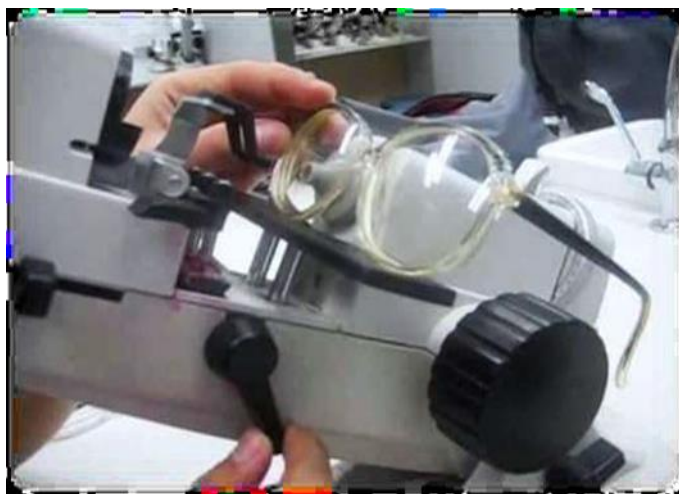


Fig. (3-4): Lens- meter [13].

B- For the purpose of reducing the effect of the rays emitted by opposite cars (yellow light) on the driver's eye by using filters to absorb those rays (as a treatment) without affecting the eye, so four different samples were taken from local markets and a permeability test was conducted for them and to determine the most suitable. Four samples one by using Biotech Engineering Management CO. UV 9200 .at Al-Nahrain University.

Samples 1-4:

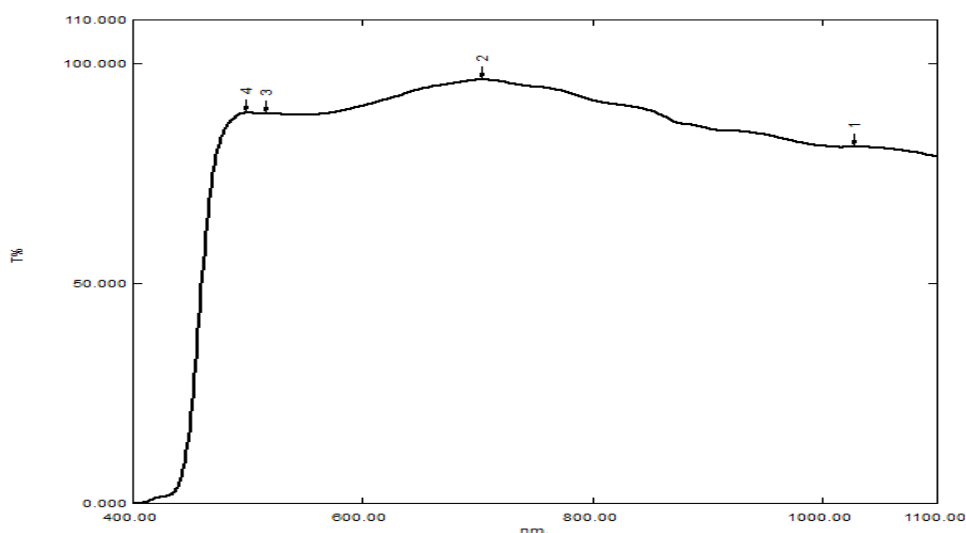


Fig. (1): represents the relationship between the transmittance (T) and wavelength of the first model of the filter yellow color T more than 90%.

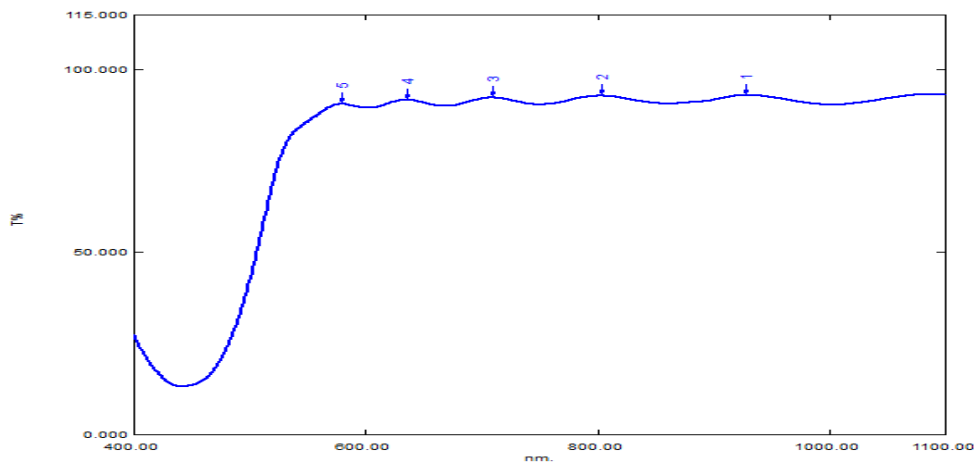


Fig (2): The relationship between transmittance and wave length(nm) of the second model of the filter yellow color T more than 94 %.

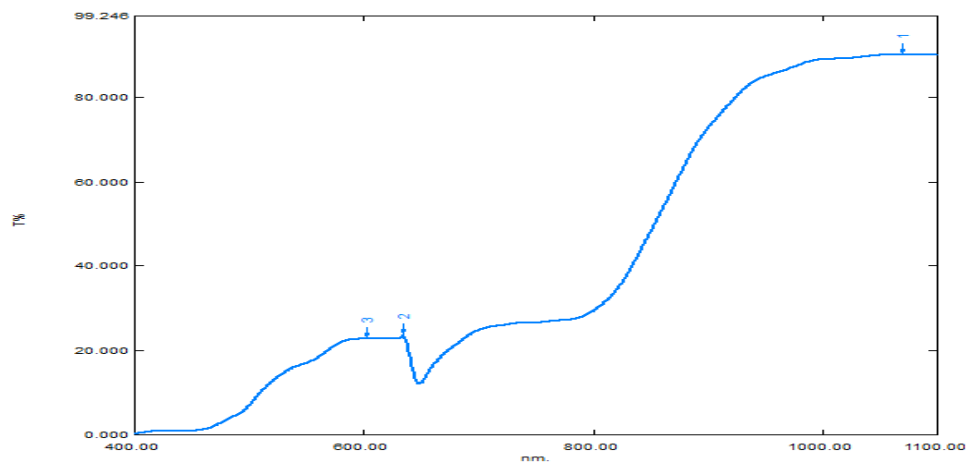


Fig (3): The relationship between transmittance and wave length in nm of the third model of the filter yellow color.

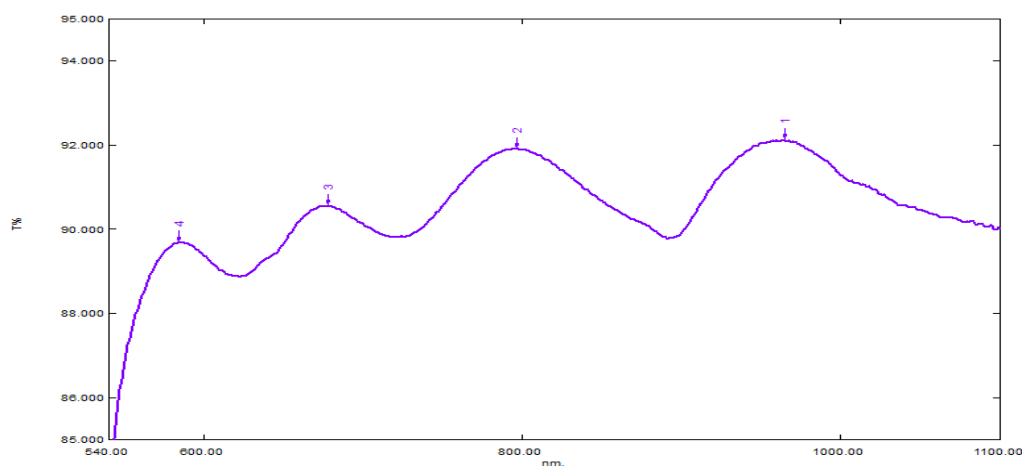


Fig (4): The relationship between transmittance and wave length in nm of the fired model of the filter yellow color.

Results

As for the results of the field examination of the market (under research) after following them continuously throughout the research period, they were as shown in the figure below (5-8):

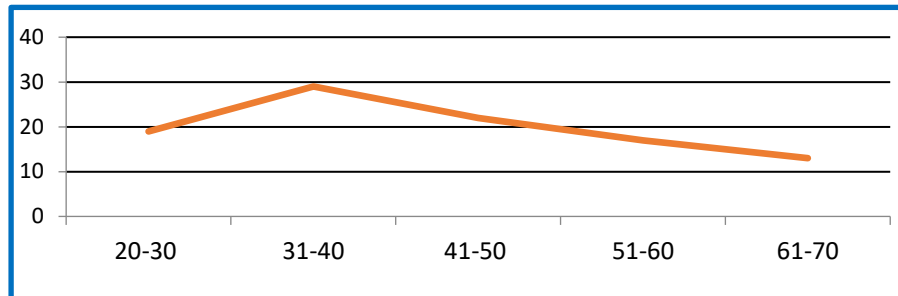


Fig (5): relationship between the age and Number of patients (drivers). The highest number of patients (registered in our research) was between the ages of 31-40 years and by 29 patients.

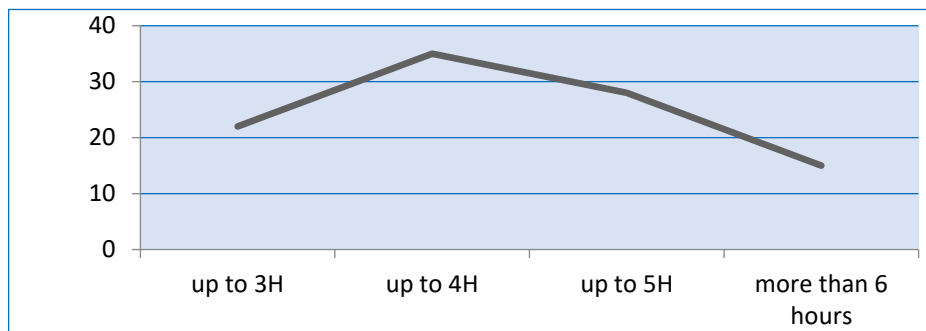


Fig.(6): shows the relationship between the age up to 70 years and the number of hours of motorists.

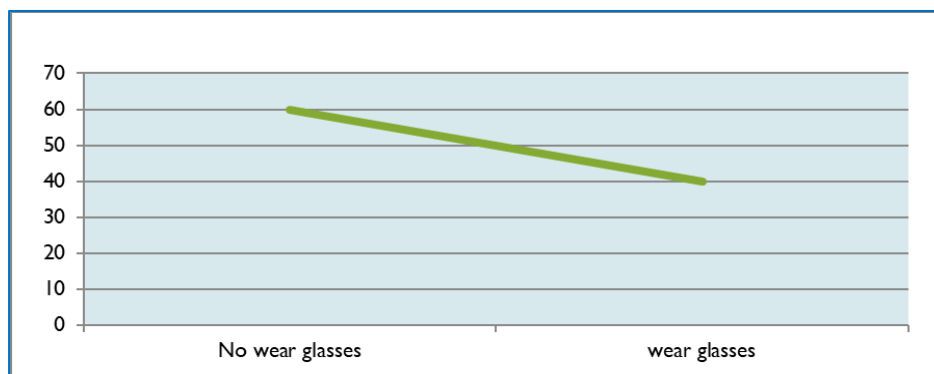


Fig.(7): relationship between the number of drivers who do not wear glasses and those who wear glasses. 60% of patients did not wear glasses during the context or not due to negligence.

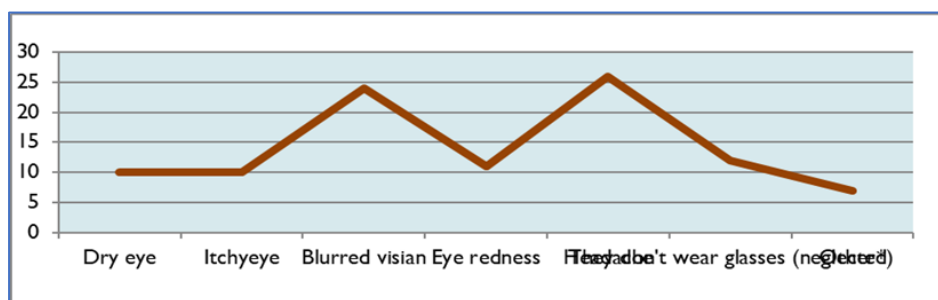


Fig. (8): The relationship between symptoms and the number of symptoms for drivers such as dry eyes, itchy eyes, blurry vision, pain,... etc.

Discussion

Samples (Patients) were taken from the Dhi Qar-Baghdad road, where it became clear that (according the age group) 20 to 30 the males number was 19 and 31 to 40 the males number was 29, and 41 to 50 the males number was 22, where the largest number of drivers was from the age of 31 to 50, and their number was 51 drivers, at a rate of 51%. As for the number of hours compared to age, the number of drivers who drive for 3 hours is 22, for those who drive for 4 hours, their number is 35, and for those who drive for 5 hours, their number is 28, and for more than 6 hours, their number is 15. Where we found that 35% were driving up to 4 hours at night every day, then 28% were driving up to 5 hours, which is the largest percentage. [Baghdad – Dhi Qar Road]. As for the number of drivers who wore medical glasses, their number was 60 drivers, and the number of those who did not wear 40 drivers.

As for the number of symptoms, it was divided into the following: dry eyes by 10%, itching of the eyes by 10%, gouache by 24%, redness of the eye by 11%, and headaches The percentage is 26%, as for those who have a refractive error and neglect glasses, it is 12%, and others by 7%. When comparing the symptoms, the highest percentage was in headaches 28% and in the second place the blurred vision was 24%.

Conclusion

- 1- According to this study on the effect of yellow light is more harmful with age, including Cataract and associated diseases with age.
- 2-The redness of the eyes caused by several diseases may be sometimes lead to temporary blindness or high sensitivity to bright light.
- 3-The presence of an uncorrected refractive error increases light scattering and pain as a result of not receiving a clear image.

4- Reducing the problems experienced by drivers by using the yellow filter glass available in the different models in the local markets as shown in the figure-2, which the second model of the filter yellow color T more than 94 %.

5-Wearing glasses and not neglecting them, choosing different types of protective filters, and wearing glasses with a yellow filter in the driver's car for long periods at night a Most drivers have poor eyesight Pain, drugs, and have headaches due to the effect of light from oncoming cars.

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