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Preventive Effect of Ophthalmic Lenses on Cataract, is it Real?

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Abstract

Knowing that the prevalence of crystalline cataracts after 40 years is relatively high and that exposure to UV rays is a factor for its appearance, since the lens is an absorber of these rays, it was intended with this pilot study to verify the relationship between the appearance of crystalline nuclear sclerosis and the time that patients take from the use of ophthalmic lenses, since they absorb most of these rays under normal conditions of use.

Keywords: Nuclear sclerosis; Ultraviolet rays.

1. Introduction

Despite being a reversible problem, cataract remains the first cause of blindness and the second cause of visual impairment worldwide [1,2]. The Cataract is responsible for the loss of vision in about 20 million people [3]. Its etiology is multifactorial and may be associated with intrinsic and extrinsic factors to the individual, such as, age, sex, genetics, tabagism habits, feeding habits and exposure to light [2]. Diabetes is also one of the risk factors for early onset cataract, however, exposure to long-term UV-A and UV-B ultraviolet radiation remains the main cause of its appearance [3].

The Human eye is constantly exposed to sunlight and artificial lighting. Sunlight is very important for the proper functioning of the biological functions of the eye, but intense exposure to ambient radiation, can pose a risk, especially for people over 40 years of age, causing transient or permanent blindness [4].

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Sunlight comprises the radiation of the electromagnetic spectrum, which is between the 290nm ultraviolet region (UV) to the infrared region [5]. Normal eye characteristics allow this radiation to be absorbed to limit its arrival to the retina. The cornea absorve UV radiation below 300 nm and the lens attenuate the transmission of most wavelengths between 300 and 400 nm. UV-A And UV-B ultraviolet rays induce cataract formation and are not necessary for vision. Both UV-A and UV-B are absorbed by the lens and act with different mechanisms causing chronically and progressive photochemical damage to the lens structure [3]. The elimination of radiation, from these wavelengths, in eye exposure will greatly reduce laughter from early cataract lesions, this can be done in a simple way, through the use of sunglasses or contact lenses with UV protection [4]. The lens absorbs most UV, together with the cornea, this fact has already been confirmed by several epidemiological studies [3]. UV exposure is strongly related to the risk of cataracts development. The effects of UV exposure on the lens are recognized as a risk factor for cataract development [2]. When aged and with cataracts the lens becomes more vulnerable to UV-A radiation than a middle-aged lens [6].

Cataract can be classified into 3 main types: subcortical, nuclear and posterior cortical. Outdoor work is a determining risk factor for the onset of cataract, with studies proving the relationship between prolonged exposure to radiation and cortical cataract.

Glutathione levels in the lens usually protect proteins from oxidation, but decrease with age, resulting in oxidative damage that, in turn, leads to the unfolding of proteins and aggregation in the development of cataracts, epidemiological studies have elucidated some of the factors that contribute to the development of age-related cataracts [7]. Cataract is very common in people over 50 years of age, and age is one of the factors responsible for the emergence of this alteration [7]. Ultraviolet radiation (UV) and oxidative stress are thought to play particularly important roles. UV radiation from sunlight causes the formation of reactive oxygen species [7]. When changes caused by crystalline aging begin to emerge, changes such as decreased structure transparency, presbyopia, increased dispersion and aberration of light waves begin to emerge, as well as a degradation of the optical quality of the eye [8]. Although effective strategies are not yet known in preventing the beginning of cataract, good results have already been achieved with oral administration of antioxidants, as well as, promising results have already been achieved by reducing oxidative damage caused by UV [8]. According to review studies [3], it is suggested the need to implement preventive measures as well as the demonstration of their effectiveness.

2. Methodology

Population and study show

Our study population was patients who came to us to change Rx from glasses because they were no longer seeing well. Fifty-one patients of both sexes were selected and were examined during the period of September and October 2019 in Lisbon.

Inclusion criteria

For inclusion criteria of the study, the following were considered:

- Patients over 40 years of age

- Both sexes

- Wearing glasses

Exclusion criteria

For exclusion criteria of the study, the following were considered:

- Age under 39 years

- Previous eye surgery

- Eye pathology excluding cataracts

- Systemic diseases with eye affectation: Diabetes; Hypertension

- Autoimmune systemic diseases

General study drawing

A mixed study whose method of selection of the show was performed by "convenience show" among patients who resorted to our services in the Area of Lisbon in need of changing their usual prescription.

Description of variables

Quantitative variables measured during the consultation:

- Refraction

- Crystalline opacity degree classification

Qualitative variables

- Survey on the start date of wearing glasses

Description of techniques

All patients were an anamnesis made where the most important points were collected, in view of the exclusion criteria, such as: family history; personal background; date of birth expressed in age in number of years; encoded in a database as female and male. Regarding refractive status, the spherical values used by the patient were recorded and a new refractive examination was performed using objective methods, using the Nidek ARK-1s refractometer and subjective author using Nidek RT-600 foropter with cylinders Jackson's crusaders to fine-tune

the cylindrical values of the prescription, for comparison of refractive data, between what the patient used before and what he needs after the examination, only spherical values with negative cylinder were considered. With regard to visual health analysis, the following methods and means were used; for posterior pathology detection, Nidek AFC-210 camera funds were used for cataract detection and classification. In relation to the analysis of funds, there was the existence or not of vascular alterations, maculopathies and alterations in the papilla of the optic nerve. In relation to the detection and observation of the type of existing cataracts, the following criteria were used:

Grade 0 nuclear sclerosis - lack of opacity

Grade 1 nuclear sclerosis – Slight nuclear opacity slightly affecting vision quality, but still allowing an AV of 6/6.

Grade 2 nuclear sclerosis – Nuclear opacity in which AV can decrease to 6/12

Grade 3 nuclear sclerosis – Nuclear opacity in which AV can decrease to 6/36

Grade 4 nuclear sclerosis – Dense nuclear opacity in which AV does not exceed 6/36.

A 1/2 scale was also considered when the degree of sclerosis did not fit the unit scale.

3. Results

The study included 102 eyes from 51 patients, 34 women and 17 men, aged between 40 and 97 years, as shown in Figures 1 and 2 and 3.

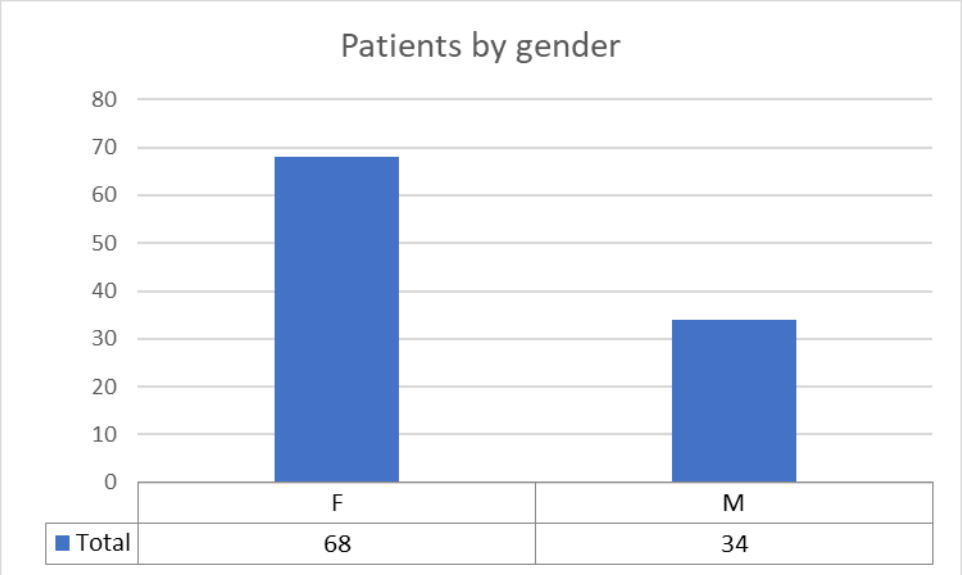

Figure 1

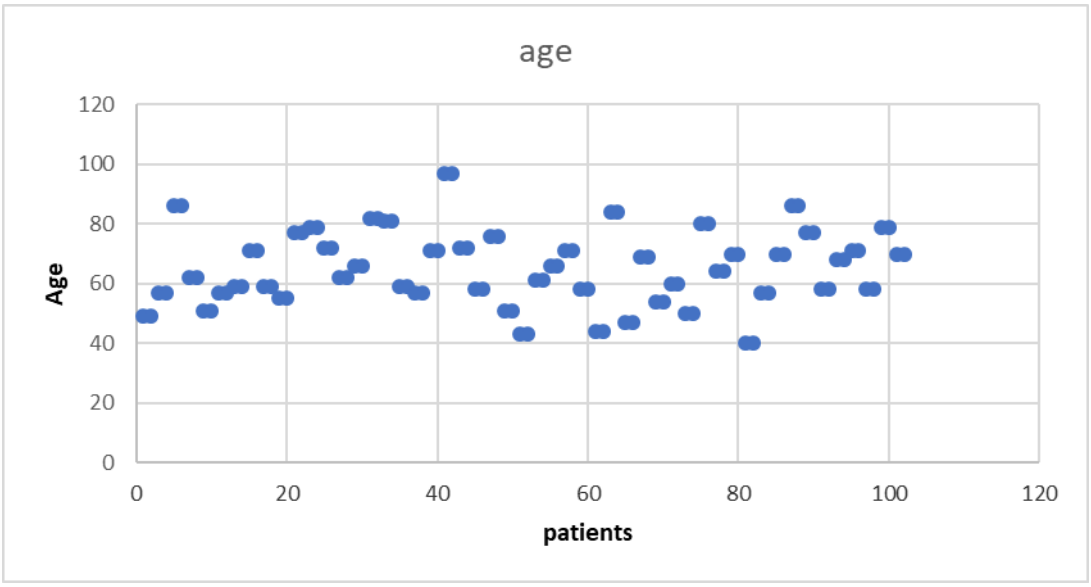

Figure 2

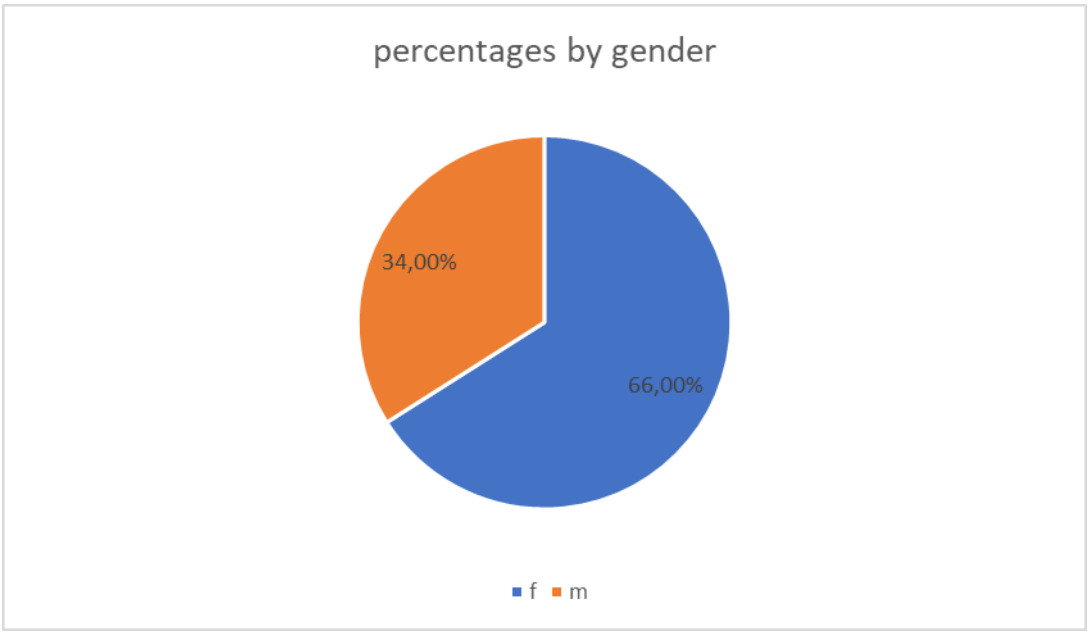

Figure 3

Of the patients involved in the study, 48.04% had any degree of cataracts, Figure 4.

Regarding the type of cataracts found in this sample, 80.43% were nuclear, 17.39% cortical and only 2.17% were posterior subcapsular, as can be seen in Figures 5 and 6.

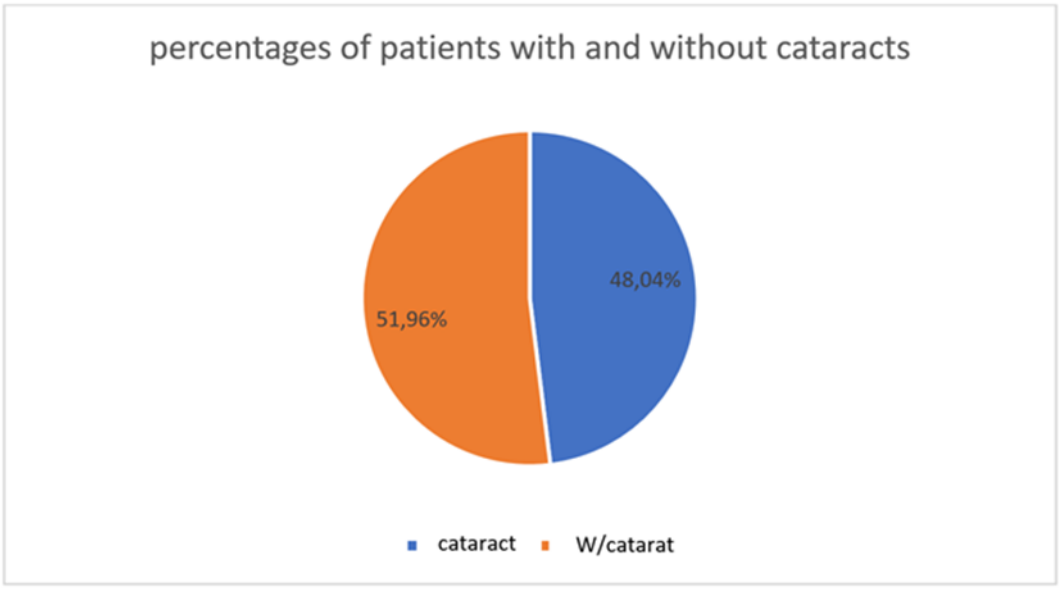

Figure 4

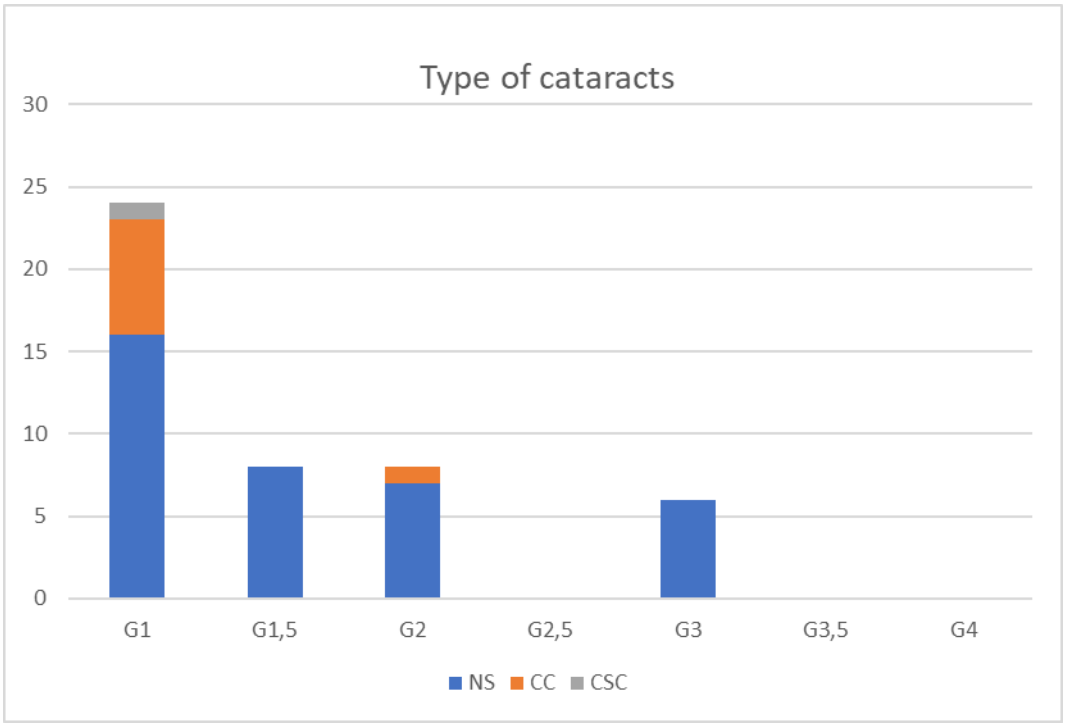

Figure 5

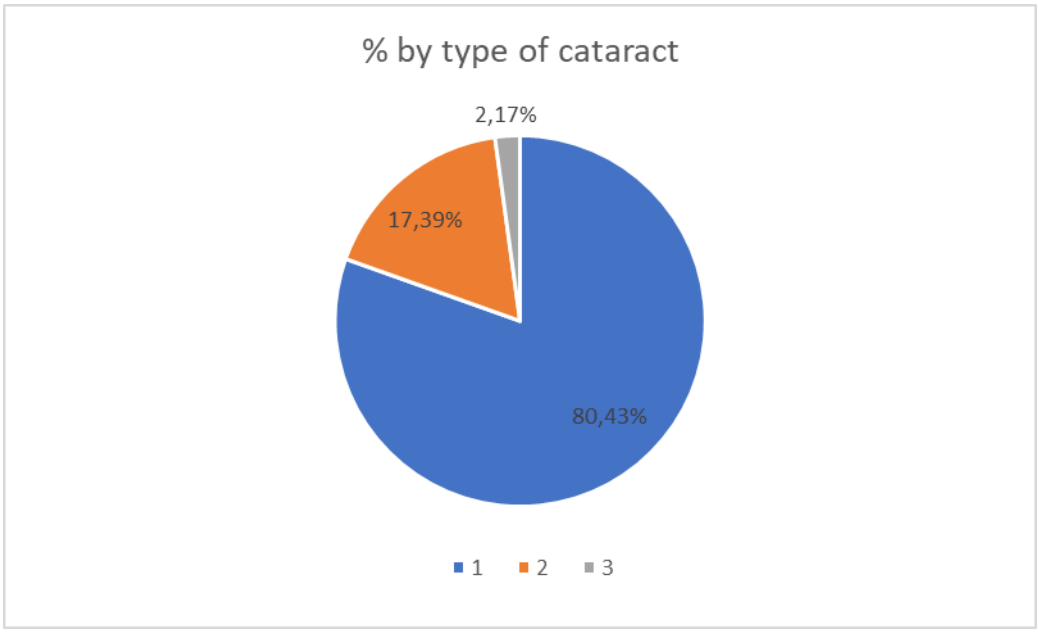

Figure 6

Corresponding to this percentage of patients with cataracts who in no case reached levels higher than grade 3, there was a decrease, in absolute terms, of the average prescription at about 0.31D as evidenced in Figure 7.

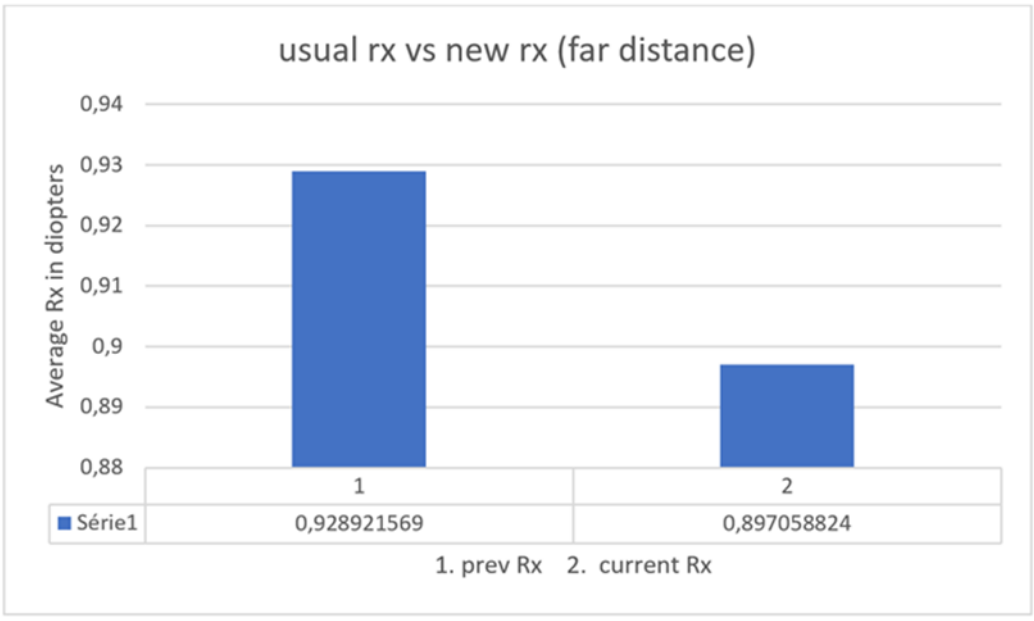

Figure 7

Regarding the main object of this study, verifying some relationship causes effect, between the age at which the patient began wearing glasses and his degree of cataract, it is concluded that there is an increase in the prevalence of cataracts in patients who began to wear glasses more afternoon and consequently were more subject to exposure of Ultraviolet rays, Figure 8.

It is observed that patients who started wearing glasses in the first two decades of life have virtually no degree of cataract compared to those who only started using them from the age of 40 in which prevalence rises exponentially as if can be seen in Figure 9.

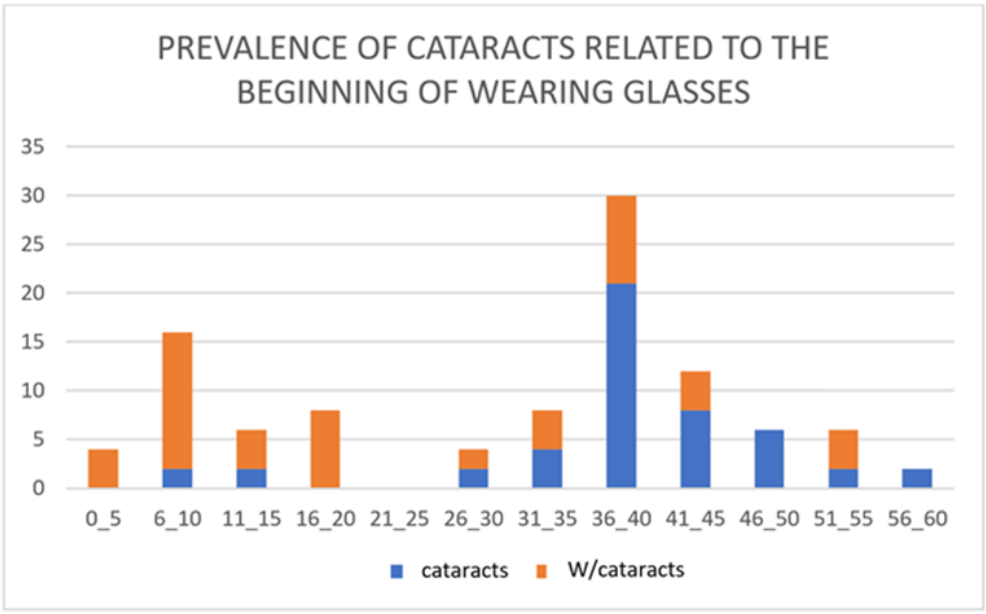

Figure 8

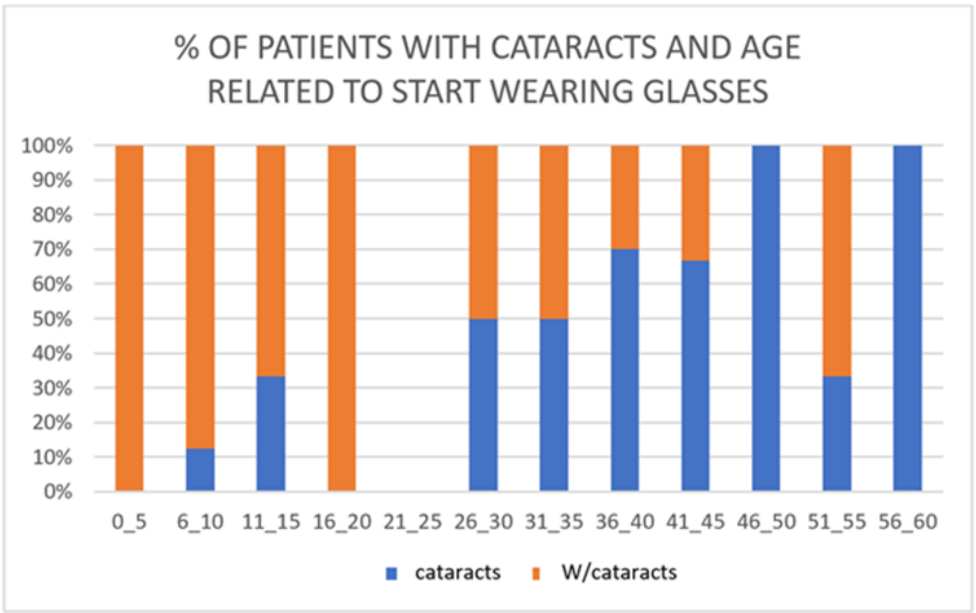

Figure 9

4. Conclusions

Cataracts are a problem that has increased in recent years and contributes in many countries to increased reversible blindness with very high economic costs.

In this study we found that the earlier the patient began to wear glasses permanently; the less incidence of cataract has when reaching critical age of onset; 60 years old.

It was found that UV protection of ophthalmic lenses, regardless of their staining, may be a lower-wear agent of the lens core and consequently help the non-early appearance of nuclear sclerosis.

It will be necessary in the future to extend the object of this study to more patients and record their provenance and professional activity.

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