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"IMPACTS AND COMPLICATIONS OF ANISOMETROPIA ON HUMAN'S EYE AND VISION"

Osama Qays Abdullah (1)
Aicha bougharíou (2)
Ahmed Mohammed Khadum Abdulamer Al-Araji (3)
(1) PhD student, faculty des science, university de sfax- Tunis (oqais495@gmail.com),
(1) Alkarkh university of science- Iraq (osama.alsalhi@kus.edu.iq)
(2) Faculty des sciences, university de sfax- Tunis(aicha_boughariou@yahoo.fr)
(3) Ophthalmologist senior H.O., Ministry of Health, Iraq (amk84alarajii@yahoo.com)
Correspondence author (work e-mail: osama.alsalhi@kus.edu.iq)
(student e-mail: (oqais495@gmail.com)
mobil.no. 009647702614206

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Abstract:
Anisometropia is a condition in which one eye has a significantly different refractive error from the other, which can lead to a variety of complications and impacts on human vision. Binocular vision problems, keratocounus, differences in axial length, strabismus, reduced visual acuity, amblyopia, and reduced depth perception may occur. Each eye must have optical treatment with glasses or contact lenses, and in some cases, surgery or vision therapy may be necessary. In this study 400 cases were selected to study the Anisometropia impacts and complications on the eye using different tools and optical equipment's such as: snellen chart, Auto-Refractometry, and Retinoscopy. The selected cases were classified according to age and gender, as well as the type of pathological suffering; different statistical studies were achieved, and the results show that there is a correlation between anisometropia and the difference in dioptric power, as well as a relationship between anisometropia and different types of eye diseases such as cataract, squint, and keratoconus.

Aim of the study
Evaluating the impacts of anisometropia on human vision, and to investigate factors associated with it in dioptric power, age, gender, and pathological causes in Baghdad.

Keywords: Anisometropia , Refractive error, Keratoconus, Human's Vision.

1. INTRODUCTION

Anisometropia is a condition where one eye has a significantly different refractive error than the other eye. Refractive error refers to the degree to which the eye is unable to bend light to focus it on the retina, which is necessary for clear vision. Anisometropia can occur in nearsightedness, farsightedness, and astigmatism [1,2]. Anisometropia refers to the condition of unequal refractive errors between the two eyes, because of the differences in the axial lengths [2]. Anisometropia and amblyopia are typically diagnosed in children before school age using school vision screening. Earlier diagnosis is rare due to the absence of symptoms and obvious signs in most cases. Amblyopia is generally found in the more refractive error eye, with a higher prevalence in anisohyperopes compared to anisomyopes [3,4]. Anisometropia is typically considered a fundamental axial length anomaly in which the size of the right and left eyes differ, but in some instances it can be refractive when the optical power of the eyes differs. Anisometropia is not completely an issue of (right- versus left) eye axial length difference in that individuals with anisometropia, also tend to display high levels of astigmatism and individuals with aniso-astigmatism, defined as the absolute difference in the refractive astigmatism present differences in corneal toricity, which is a type of refractive error [5,6]. There are different types of treatment; one of them is the optical correction which is effective in preventing amblyopia only if it is done when the visual cortex synapses are still plastic as in pediatric age group till eight years. A lower amount of anisometropia and a better visual acuity in the amblyopic eye at baseline increase the probability of resolving amblyopia and anisometropia. This type of treatment, when amblyopia is not associated with strabismus, also acts on the anisometropic component inducing a certain degree of emmetropization [7].

2. MATERIALS AND METHODS

This study includes the record of anisometropia effects and complications on the eye for (400) cases who had

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anisometropia with a difference in the refractive errors between the eyes of at least two diopters (D). Patients were examining in Ibn Al-Haitham Teaching Eye Hospital Iraq – Baghdad, during the period from April 2023 to June 2023, using different instruments; these are; Snelle'n chart, autoreferactometer, retinaoscopy examination, and different tools in the trial case lenses box. The patient's history of the onset of decreased vision was obtained. An ophthalmologist checked the patient for the existence of any ophthalmological causes, such as corneal opacity, lens opacity, and axial length. The patient was sat 6 m away from the snelle'n chart, and the visual acuity was assessed by closing the eye that was not being examined and asking the patient to read the chart. The degree of visual acuity is measured as the line that the patient can clearly perceive. Although refractive errors (myopia, hyperopia, and astigmatism) are estimated using an autorefractometer and using trial-case lenses by practice and error, the reading of the autorefractometer was recorded as (sphere, cylinder, and axis) for both eyes of each patient.

Table (1). Anisometropia cases

Age	No. of patients		Total
	Anisometropia	None	
10-19	14	55	69
20-29	55	133	188
30-39	27	54	81
40-49	6	20	26
50-59	7	13	20
60-69	8	6	14
70-79	0	1	1
80-89	0	1	1
Total	117	283	400

3. RESULTS AND DISCUSSION

3.1 Anisometropia cases according to age: there are 117 cases diagnosed, and the percentage is (29.25%), while 283 (70.75%) don't have anisometropia, as shown in table 1 and figure 1. The cases are divided into eight groups according to age. The results of table 2 and figure 2 show that anisometropia tends to be more common in young adult populations. However, the relationship between anisometropia and age depends on different factors, such as the type and severity of refractive error onset and genetics.

figure (1) Anisometropia cases and percentage.

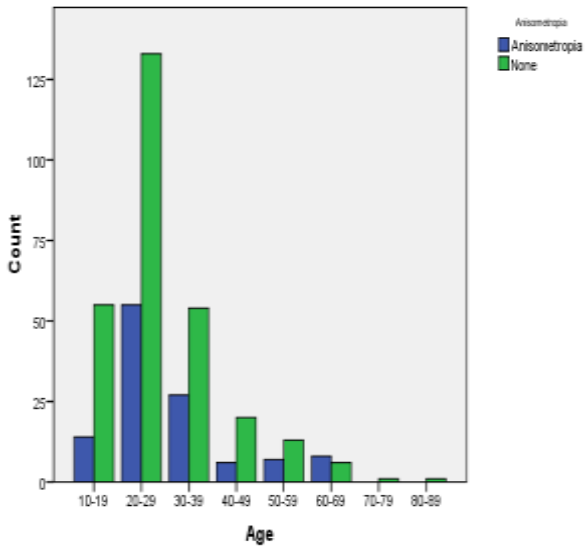

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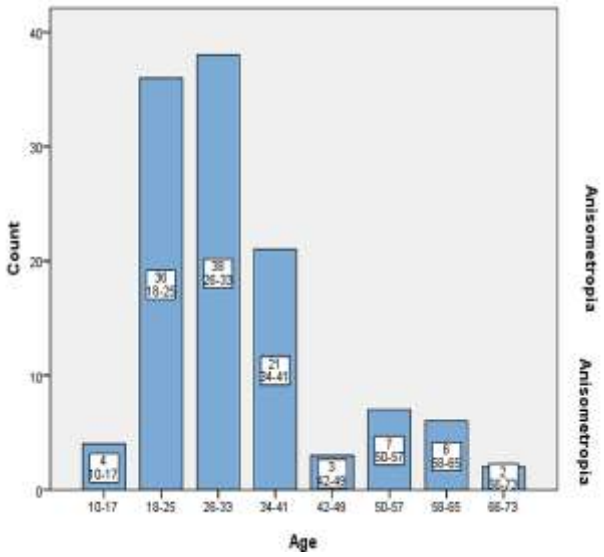
Table (2): Cases of Anisometropia according to the age.

Age	No. of patients	Percentage (%)
10-17	4	3
18-25	36	30
26-33	38	33
34-41	21	18
42-49	3	3
50-57	7	6
58-65	6	5
66-73	2	2
Total	117	100

figure (2): this figure shows the relationship between anisometropia and age



3.2 Anisometropia according to gender: Table 3 shows that Out of the 400 cases, there were two categories: Anisometropia: there were a total of 117 cases, with 48 cases being male and 69 cases being female. None Anisometropia: there were a total of 283 cases, with 134 cases being male and 149 cases being female.

3.3 Anisometropia according to the difference in the dioptric power between the two eyes: Study found that (63) cases of Anisometropia were recorded when the difference is between (3 -5) diopters and the percentage is (53.8%) as it showed in table 4. While the lowest percentage were recorded when the differences is above 11 diopters.

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Table (3). Anisometropia according to Gender.

Case	Gender		Total
	Male	Female	
Anisometropia	48	69	117
None Anisometropia	134	149	283
Total	182	218	400

Figure (3). Anisometropia according to Gender

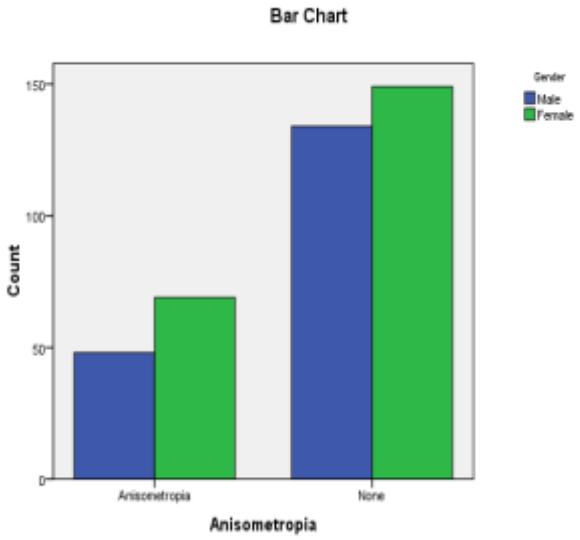
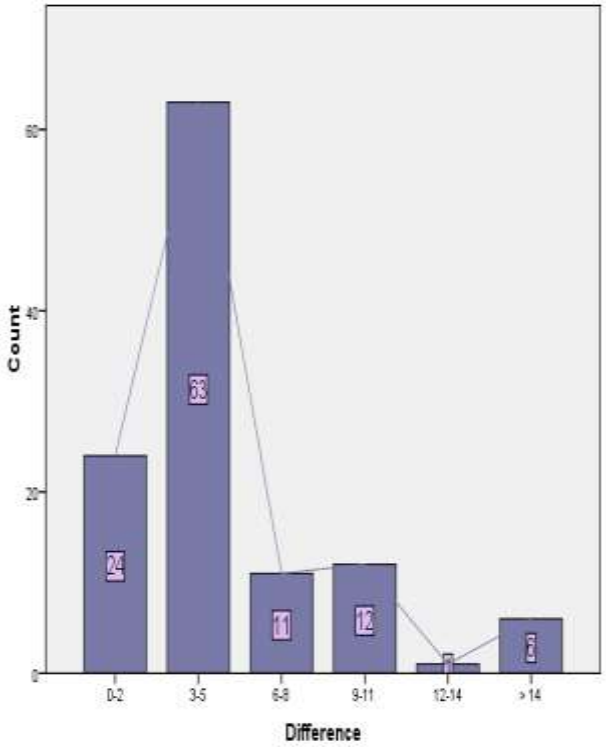


Table (4). Anisometropia according to the Difference in Diopters.

Difference	No. of patients	Percentage (%)
0-2	24	20.5
3-5	63	53.8
6-8	11	9.4
9-11	12	10.3
12-14	1	0.9
>14	6	5.1
Total	117	100

Figure (4). Anisometropia according to the Difference in Diopters.



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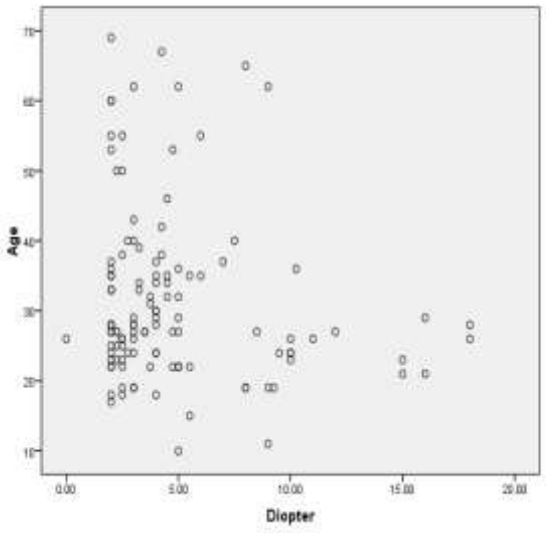

Figure (5). Relation between age and difference in diopter.

3.4 Pathological condition associated with Anisometropia

Cases were classified based on pathological factors, as shown in the table and figure (5). There were no clinical symptoms in 70 patients (59.8%) of the 117 cases of anisometropia, while 40.2% had a pathological condition, such as cataracts, keratoconus, retinal causes, or squint.

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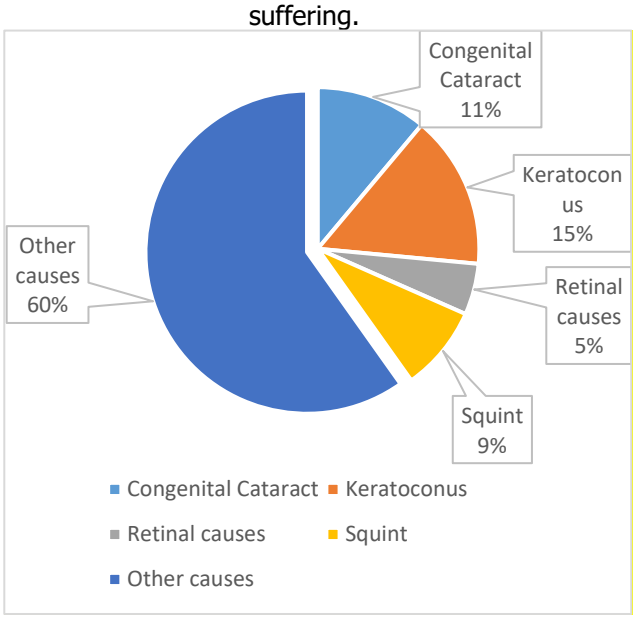
Table (5). Anisometropia According Pathological suffering.

Causes	No. of patients	Percentage (%)
Congenital Cataract	13	11.1
Keratoconus	18	15.4
Retinal causes	6	5.1
Squint	10	8.5
Other causes	70	59.8
Total	117	100

Figure (6). Anisometropia According Pathological suffering.



4. CONCLUSION

In this study, 117 cases of anisometropia were identified from 400 prescriptions gathered from clinics and facilities for optometrists. Young adult populations are more prone to anisometropia. The association between anisometropia and age, on the other hand, is based on a variety of factors, including refractive defect type and degree, as well as genetics. Females have a higher proportion of anisometropia than males. The percentage was high when the difference was between 3 and 5 diopters, with a rate of 53.8%, while the differences were greater than 11 diopters, the percentage was the lowest. Anisometropia can be caused by various factors, such as genetics, amblyopia, keratoconus, and eye injury or surgery.

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