Original Article

Patterns of Refractive Errors in a Sample from Ibn Al Haytham Hospital, Baghdad, Iraq

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Abstract

Purpose: To evaluate the patterns of refractive errors among patients who visited Ibn Al Haytham hospital, Baghdad, Iraq, from January 2023 to October 2023.
Patients and Methods: This cross-sectional observational study was conducted between January 2023 and December 2023. Participants aged 18 and above were selected using random sampling from individuals referred for eye care at the Ibn Al Haytham hospital, Baghdad, Iraq, during the study period. Data were collected using a standardized checklist. Visual acuity tests with a Snellen chart, and refractive error measurements using an autorefractometer were performed.
Results: Of the 309 participants included in the study, myopia was the most prevalent condition, affecting 63.8 % (n = 197), while hyperopia was present in 36.2 % (n = 112). Additionally, 40.1 % (n = 124) of participants had astigmatism, and 34.63 % (n = 107) had abnormal visual acuity. The distribution of refractive errors by gender showed that myopia (68.02 %, P = 0.001) and astigmatism (69.35 %, P = 0.016) were more prevalent in female participants. Job status was also associated with the distribution of refractive errors (P = 0.040) and astigmatism (P = 0.002). Finally, family history showed a significant association with the pattern of refractive errors among participants (P = 0.035).
Conclusion: The study results highlight significant variations in the prevalence and patterns of refractive errors among patients at Ibn Al Haytham hospital, Baghdad, Iraq, with myopia being the most common condition. Gender, job type and familial history were found to have significant associations with different types of refractive errors.

Keywords: Refractive Errors; Prevalence; Myopia; Association; Iraq.

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Introduction

Refractive errors are among the most common ocular diseases [1]. These errors can occur at any age and in all regions of the world. Refractive errors can lead to advanced visual impairments, which significantly impact personal, educational, and social development [2, 3]. Myopia and hyperopia are the most common types of refractive errors, and both are associated with variations in the axial length of the eye [4]. The axial length refers to the distance between the corneal surface and the retina. Changes in this length, due to various factors, can result in refractive errors [5, 6]. Factors such as age, gender, demographic attributes (BMI), environmental influences, and lifestyle choices (near-work activities) are linked to the occurrence of refractive errors [7, 8]. Evaluating the prevalence and patterns of refractive errors is important, as it provides the data necessary to develop and implement cost-effective clinical interventions [9, 10].

Examining patients for refractive errors is a relatively inexpensive and non-invasive procedure accessible in many clinics. Using simple devices such as retinoscopes, autorefractors, and subjective refraction tests, eye care professionals can determine the degree and type of refractive error [11, 12].

Treating refractive errors in their early stages is cost-effective, less invasive, and more efficient. Early intervention can prevent the need for complex and costly treatments at later stages [13, 14]. On the other hand delayed diagnosis of refractive errors can result in visual impairment, necessitating advanced procedures that are expensive and more complex [15]. Early detection requires reliable data on the prevalence and associated factors of refractive errors [16].

This study was conducted to evaluate the patterns of refractive errors in Ibn Al Haytham hospital, Baghdad, Iraq.

Patients and Methods

Study Design and Setting

This study was conducted as a cross-sectional observational study over 12 months, from January 2023 to December 2023, at Ibn Al Haytham hospital in Baghdad, Iraq. A significant portion of the Baghdadi population seeks eye examinations at this clinic, making it a representative sample of the local patient population.

Research Participants

Participants were selected using a random sampling method. After selection, inclusion and exclusion criteria were applied. Participants included in this study were aged 18 years or older, and have visited and undergone examinations at Ibn Al Haytham hospital, Baghdad, Iraq, for eye care between January 2023 and October 2023. Those with severe ocular diseases such as advanced glaucoma, untreated cataracts, or active retinal diseases, a history of eye surgery within the past six months, mental illnesses or cognitive disabilities, and major language or communication barriers were excluded from the study.

Data Collection

Data collection consisted of two main components. The first component involved collecting demographic information through a checklist and medical records. This included data such as age, gender, occupation, education level, and relevant medical history. The second component involved visual and refractive data. Visual acuity and refractive errors were assessed by the optometry staff at Ibn Al Haythamm hospital, Baghdad, Iraq. Visual acuity was measured using a Snellen chart, and refractive errors were objectively evaluated with a Tonoref II ARK-510A autorefractometer (Nidek Inc., Aichi, Japan).

Data Entry and Analysis

Collected data, including demographic information, checklist responses, and clinical data, were entered into Excel. The dataset was reviewed to identify and address outliers, missing values, and inconsistencies before conducting statistical analysis. The prevalence and patterns of refractive errors were described using frequency, and percentages. For normally distributed quantitative variables, the mean and standard deviation (SD) were calculated. To evaluate associations between refractive errors and categorical risk factors, chi-square and Fisher's exact tests were applied. Mean differences in quantitative variables across refractive error subgroups were assessed using analysis of variance (ANOVA). Statistical analyses were conducted using SPSS software version 26 (Armonk, NY: IBM Corp), and a two-tailed P value of less than 0.05 was considered statistically significant.

Ethical Considerations

The study protocol was reviewed and approved by the ethics committee of Iran University of Medical Sciences and the Institutional Review Board of Ibn Al Haytham hospital, Baghdad, Iraq. Informed consent was obtained from all participants before data collection. Participants were provided with information about the study's objectives, methods, and potential risks by trained staff.

Results

The demographic and clinical characteristics of the participants are shown in table 1. A total of 309 patients participated in this study. The mean age of the participants was 26.16 ± 5.27 years. Among the participants, 61.17 % were female (n = 189). The majority of participants had a diploma-level education (66.02 %, n = 204), followed by a bachelor's degree (21.04 %, n = 65), a master's degree (10.68 %, n = 33), and a doctoral degree (2.27 %, n = 7) (Table 1).

In terms of occupation, most participants were housekeepers (54.37 %, n = 168), followed by individuals in non-governmental jobs (32.36 %, n = 100), governmental jobs (10.36 %, n = 32), and unemployed participants (2.91 %, n=9). More than half of the participants reported no family history of refractive errors (54.37 %, n = 168). The use of mobile and digital devices also varied among participants: 35.60 % (n = 110) used devices for more than 8 hours daily, 34.63 % (n = 107) used them for 4 to 8 hours daily, and 29.77 % (n = 92) used them for less than 4 hours daily (Table 1).

The analysis of refractive error patterns revealed that myopia was the most prevalent refractive error, affecting 63.8 % of participants (n = 197), followed by hyperopia at 36.2 % (n = 112). The prevalence of astigmatism was 40.1 % (n = 124). Furthermore, 65.37 % of participants (n = 202) had normal visual acuity, while 34.63 % (n = 107) exhibited abnormal visual acuity (Table 1, Figure 1).

On the other hand, determining the association between refractive errors and associated factors showed that participants with hyperopia had a lower mean age compared to those with myopia (25.76 ± 5.56 vs. 26.40 ± 5.10 years). However, this difference was not statistically significant (P = 0.308). In addition, the distribution of refractive errors

Table 1: Participants' demographic characteristics and clinical findings

Variable	Category	Frequency	Percent
Age	Age (mean ± SD)	26.16 ± 5.27	-
Sex	Female	189	61.17
	Male	120	38.83
	Total	309	100
Job	Governmental	32	10.36
	House Keeper	168	54.37
	Non-Gov	100	32.36
	Without Work	9	2.91
	Total	309	100
Education	BSC	65	21.04
	MSc	33	10.68
	PhD	7	2.27
	Diploma	204	66.02
	Total	309	100
Mobile/Digital Device Using	Lower than 4 hours	92	29.77
	Between 4-8 hours	107	34.63
	More than 8 hours	110	35.6
	Total	309	100
Family History of RE	No	168	54.37
	Yes	141	45.63
	Total	309	100
RE Status	Myopia	197	63.8
	Hyperopia	112	36.2
	Total	309	100
Astigmatism	No	185	59.9
	Yes	124	40.1
	Total	309	100
Abnormal Visual Acuity	No	202	65.37
	Yes	107	34.63
Total		309	100

Table 2: The relation between refractive error status and demographic variables

Variable	Category	Refractive Error Status		P value	Astigmatism		Total	P value
		Myopia	Hyperopia		No	Yes		
Age (Mean)		26.40 ± 5.10	25.76 ± 5.56	0.308**	26.10 ± 5.43	26.26 ± 5.05	26.16 ± 5.27	0.8**
Sex	Female	134 (68.02)	55 (49.11)	0.001*	103 (55.68)	86 (69.35)	189	0.016*
	Male	63 (31.98)	57 (50.89)		82 (44.32)	38 (30.65)	120	
Job	Governmental	20 (10.15)	12 (10.71)	0.04*	28 (15.14)	4 (3.23)	32	0.002*
	House Keeper	117 (59.39)	51 (45.54)		92 (49.73)	76 (61.29)	168	
	Non-Governmental	53 (26.90)	47 (41.96)		62 (33.51)	38 (30.65)	100	
	Without Work	7 (3.55)	2 (1.79)		3 (1.62)	6 (4.84)	9	
Education	BSC	43 (21.83)	22 (19.64)	0.556*	43 (23.24)	22 (17.74)	65	0.305*
	MSc	23 (11.68)	10 (8.93)		19 (10.27)	14 (11.29)	33	
	PhD	3 (1.52)	4 (3.57)		6 (3.24)	1 (0.81)	7	
	Diploma	128 (64.97)	76 (67.86)		117 (63.24)	87 (70.16)	204	
Mobile/Digital Device Usage	Mild usage	59 (29.95)	33 (29.46)	0.242*	55 (29.73)	37 (29.84)	92	0.724*
	Moderate usage	74 (37.56)	33 (29.46)		67 (36.22)	40 (32.26)	107	
	Severe usage	64 (32.49)	46 (41.07)		63 (34.05)	47 (37.90)	110	
Family History of Refractive Errors	No	116 (58.88)	52 (46.43)	0.035*	96 (51.89)	72 (58.06)	168	0.286*
	Yes	81 (41.12)	60 (53.57)		89 (48.11)	52 (41.94)	141	

* Based on Chi-Squared
** Based on Independent Sample T-test

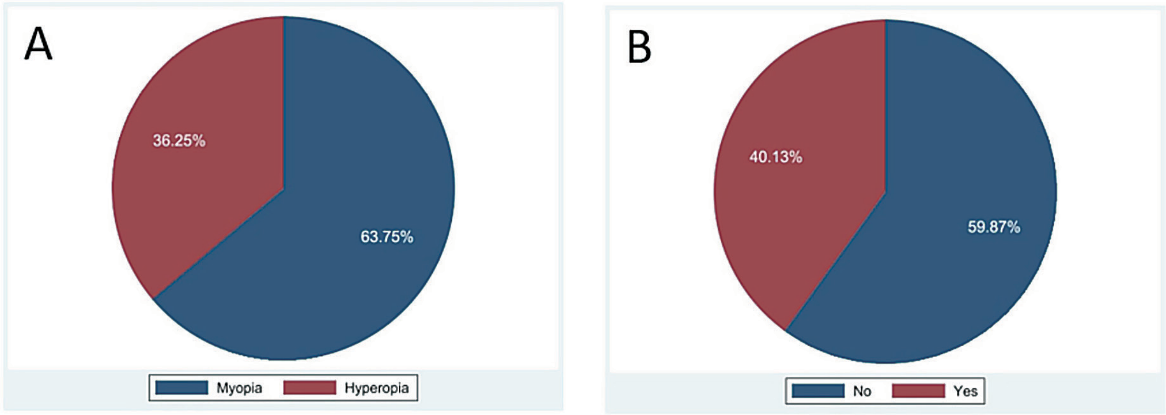

Figure 1: A: distribution of refractive errors among participants. B: distribution of astigmatism among participants

varied by gender. Myopia was more prevalent in females (68.02 %), while hyperopia was more prevalent in males (50.89 %), and this difference was statistically significant (P = 0.001). The distribution of job status also showed significant differences between refractive error subgroups (P = 0.04), with myopia being the most prevalent condition across job subgroups. Finally, myopia was more common in participants with a family history of refractive errors (Table 2).

The analysis of astigmatism and its associated factors revealed no significant difference in the mean age of participants with and without astigmatism (26.26 ± 5.05 vs. 26.10 ± 5.43 years, P = 0.800). However, astigmatism was significantly more prevalent in females (69.35 %) than in males (30.65 %; P = 0.016). The prevalence of astigmatism was lowest among participants with governmental jobs (3.23 %), while it was higher among housekeepers (61.29 %) and those with non-governmental jobs (30.65 %). This difference was statistically significant (P = 0.002) (Table 2).

The distribution of astigmatism across educational levels was as follows: 70.16 % in participants with a diploma, 17.74 % with a bachelor's degree, 11.29 % with a master's degree, and 0.81 % with a doctoral degree. These differences were not statistically significant (P = 0.305). Additionally, the prevalence of astigmatism based on digital device usage was 29.84 % for participants with mild usage, 32.26 % for those with moderate usage, and 37.90 % for those with severe usage. However, device usage was not significantly associated with astigmatism (P = 0.724). Lastly, the prevalence of astigmatism in participants without a family history of refractive errors was 58.06 %, compared to 41.94 % in participants with a family history. This difference was also not statistically significant (P = 0.286) (Table 2).

Discussion

The primary aim of this study was to assess the patterns of refractive errors among patients visiting Ibn Al Haytham hospital in Baghdad, Iraq. Our findings indicate a high proportion of myopia among participants, highlighting an important concern for the Baghdadi population. This high prevalence of myopia aligns with previous studies that report an increasing global trend, especially in educated and urban populations [17].

Hyperopia was also prevalent in the study population, with 36.25 % of participants with refractive errors diagnosed with hyperopia. A study conducted by Hashemi et al., [18] has reported a global prevalence of hyperopia at approximately 4.6 % in the general population. The difference between our findings and those of Hashemi et al., [18] can be attributed to differences in the study populations. Our study focused on patients with refractive errors, whereas Hashemi et al., [18] assessed the prevalence and pattern of refractive errors in a normal population.

Our results demonstrated significant differences in the pattern of refractive errors and astigmatism between males and females. This finding is consistent with previous studies suggesting that females are more vulnerable to refractive errors due to lifestyle factors, hormonal differences, and types of work [19, 20]. Females often engage in more near-work activities, spend more time using TVs and mobile devices, and participate in fewer outdoor activities, which may contribute to the observed differences in refractive error prevalence between genders [21].

Additionally, our findings revealed that participants' job status was associated with refractive errors and astigmatism. This underscores the importance of considering occupational factors and conducting job-specific screenings [22, 23]. The pattern observed in our study aligns with earlier research suggesting an association between near-work activities, screen time, and an increased risk of myopia [24]. For example, housekeepers, whose tasks often involve prolonged near-work activities, may experience greater eye strain, contributing to the development of myopia. Furthermore, housekeepers are likely to spend more time using digital devices, which can also increase the risk of myopia. In contrast, government employees typically engage in a mix of near- and distance-work activities, as well as outdoor tasks, potentially reducing their risk of myopia [25].

While previous studies have reported an association between digital device usage and refractive errors, [26-28] our findings did not demonstrate a significant relationship. It is important to note that our study focused on the pattern of refractive errors among participants who were already diagnosed with refractive errors. While digital device usage is associated with the onset and incidence of refractive errors, it may have a less pronounced effect on the patterns of refractive errors.

Conclusion

The study results highlight significant variations in the prevalence and patterns of refractive errors among patients at Ibn Al Haytham Hospital, Baghdad, Iraq, with myopia being the most common condition. Gender, job type and familial history were found to have significant associations with different types of refractive errors.

Acknowledgment

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Footnotes and Financial Disclosures

Conflict of interest:

The authors have no conflict of interest with the subject matter of the present manuscript.