

Prevalence and Pattern of Refractive Error in Patients Presenting to a Private Optical Company in Trinidad and Tobago W.I.

Triven Devesh Moonasar*

Abstract

Background: Refractive errors are prevalent among the patients presenting in optical hospitals and companies and contribute to adverse health outcomes such as blindness and visual impairment. Refractive error is a global health problem with a significant number of people affected and causing blindness. Uncorrected refractive errors are also costly to the global health sector due to their negative outcomes.

Aim: of a private Optical company distributed throughout Trinidad and Tobago W.I.

Method: The study adopted the quantitative method. Data were collected from 1000 records that were sampled from a private optical company representing patients who visited. The eye with the better Presenting Visual Acuity (PVA) was used for categorising the patients. The statistical method was used in data analysis.

Results: The results of the study show that there is a relatively lower prevalence of refractive error among adults and elderly persons. Children are more vulnerable to refractive error complications and are highly affected compared to adults and the elderly.

Keywords

Refractive error; Blindness; Visual impairment; Health problem

Introduction

Background information

Refractive error in hospitals is prevalent among the patients attending optical institutions, and when left uncorrected, it contributes to visual impairment and blindness globally [1]. According to Natung, et al. [2] the global estimate of the aggregate population of persons across all ages that are affected with visual impairments is approximately 253 million, out of which 36 million developed to become blind. Uncorrected refractive errors contribute to a significant portion of the visual impairment (43%), while other contributors such as cataracts follow with 33% [2]. In this regard, Natung, et al. [2] and Kaiti, et al. [1] agree that refractive errors have been identified as a significant public health problem across the world due to their contribution to the loss of sight. Visual impairments affect the welfare and wellbeing of individuals because it causes individuals to lose their right to sight thus contributing to poor access to quality education and employment opportunities, decreased participation in social and economic activities, the decline in productivity, and poor quality of life due to high dependence on others. Despite being one of the eye conditions that can easily be corrected, there is a high prevalence of uncorrected refractive errors in the eye, thus contributing to large patterns of visual impairment [3]. Additionally, Ajayi, et al. [3] noted that the complexity of the refractive errors varies in patterns across the populations associated with different ancestral origins. In this regard, it is recommended that the refractive error conditions need to be treated in advance to prevent cases of avoidable blindness [3]. Despite occurring in individuals across all ages, refractive errors are highly prevalent among the children, thus further exposing them to the dangers of visual impairment, as indicated by

theoretical foundations

Refractive error occurs when the rays of light that are parallel in nature pass through the refractive media of the eye but fail to focus on the fovea, thus causing blurring of the image observed by the affected eye [2,3]. Theoretically, refractive errors and their development across populations can be elaborated through the theory of refractive error development [5,6]. According to Hung and Ciurea [6] and Greene [5], the theory is anchored on two insights that construct the development of the refractive errors; First, the theory suggests that the local retinal-defocus plays a significant role in the emergence of environmentally induced refractive error. Second, during the ocular growth and period of maturity, the existing manipulations from the optical environment contribute to the development of the refractive error. Findings by Greene [5] show that the two insights are integrated together to successfully explain the development of the refractive errors.

Research problem

The majority of the current studies, such as Natung, et al. and Ajayi, et al. [2,3] focus on exploring the implications of the refractive error across different populations. Despite recognising that the refractive error is a bigger public health problem across the world, there is a research gap in relation to the prevalence and patterns of the complication in various health organisations and countries. According to Tedja, et al. [7] refractive errors such as myopia are the most common eye disorders across populations in the world and contribute to many

*Corresponding author: Triven Devesh Moonasar, Master in Clinical Optometry

(SAERA), Castellon de la Plana 12001, Spain, E-mail: triven.moonasar@gmail.com

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prevalence among patients visiting private Optical companies in Trinidad and Tobago W.I. The descriptive research design is suitable in quantitative studies and allows researchers to gather larger data volumes to analyse the patterns, trends, and frequencies of a given study population [14]. Therefore, the selection of the descriptive design was justified in this research because it focuses on describing the given population during data collection and analysis accurately and systematically.

Research method

The search methods describe the holistic steps adopted and implemented by the researcher during the process of collecting and analysing data. In this study, the quantitative research method was adopted. Apuke [15] noted that the quantitative method focuses on quantifying and making an in-depth analysis of all variables in order to attain results that effectively address the research questions and, generally, the research problem. The quantitative research method is

participants were fairly distributed across the areas, which enhanced the generalisation of the findings concerning the vulnerable population to refractive error in Trinidad and Tobago W.I patients (see Appendix). Specifically, 18.45% of the participants were from Frederick Street, 14.91% (Trinity), and 13.82% (West Mall). Therefore, the involvement of people from different cities across age groups enhanced the generalisation of the findings.

From One Sample-Test, Sig.000 is below the normal confidence level of 0.005, which confirmed the significant relationship between variables (Table 1). Owing to the fact that in this study, the focus was on understanding the prevalence and patterns of refractive error in patients presenting to a private Optical company in Trinidad and Tobago W.I, the findings imply that individuals from different age groups are vulnerable to the refractive error. In this study, most of the participants were from 36-80 years. The results showed that this group is less susceptible to refractive error. However, children in Trinidad and Tobago are at a higher vulnerability of suffering from refractive error. Although blindness during childhood can be prevented, the complication contributes to high levels of child mortality factors such as measles, early birth, meningitis, and lack of vitamin A. Therefore, preventing refractive error among children is closely connected to child survival, and as a result, controlling childhood blindness should be prioritised in Trinidad and Tobago. Childhood refractive error possesses several challenges that are different from controlling the adult refractive error. In this case, children tend to have an immature sight system and yet to develop normal maturation. They have to possess a clear and focused object on the retina, which are related to the higher centres responsible for vision. In cases where they fail to have normal development of sight, correction interventions are impossible during adulthood or late childhood.

The P-values and coefficient in regression analysis show the nature of relationships in the model and the mathematical relationship between the dependent and independent variables, respectively (Table 2). The results demonstrate that refractive error in patients in Trinidad and Tobago W.I. is negatively associated with spheroid (0.66), oscylinder (0.357), osaxis (0.896), and osadd (0.697). In particular, the p. value is greater than the normal significance level of 0.005, which implies that there is a low correlation between the variables. Individuals with

and where the principal meridian is perpendicular. The continuing variation in various components associated with refractive error among the elderly and the prevalence of significant levels of astigmatism and anisometropia emphasise the need for continuous evaluations to identify such complications in Trinidad and Tobago.

Myopia is the major factor that contributes to a refractive error in children and the older in Trinidad and Tobago. The patterns of age-

related rates of myopia vary, whereby the myopia prevalence increases with age in low-income households and decreases with age in high-income settings in Trinidad and Tobago. The environmental risk factors, high education, spending less time outdoors, and near work activities have been established as the risk factors for myopia which makes the old to be at a high risk of suffering from the refractive error in Trinidad and Tobago.

	Test value = 0					
	t	df	Sig. (2-tailed)	Mean difference	95% Confidence interval of the difference	
					Lower	Upper
Age	161.488	1099	0	56.305	55.62	56.99

Table 1: One sample-test.

Model		Unstandardised coefficients		Standardised coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.438	0.078		18.506	0
	OSsphere	-0.014	0.008	-0.063	-1.84	0.066
	OScylinder	-0.019	0.02	-0.03	-0.921	0.357
	OSaxis	-5.32E-05	0	-0.004	-0.131	0.896
	OSadd	-0.012	0.032	-0.013	-0.389	0.697

Note: Dependent variable: What is your gender?

Table 2: Coefficient analysis.

Model		Sum of squares	df	Mean square	F	Sig.
1	Regression	1.388	4	0.347	1.425	0.223
	Residual	239.808	985	0.243		
	Total	241.196	989			

Note: a. Dependent variable: What is your gender?

b. Predictors: (Constant), OSadd, OSaxis, OSCylinder, OSSphere.

Table 3: Hypothesis test (ANOVA).

		Sum of squares	df	Mean square	F	Sig.
Myopia	Between Groups	14.403	1	14.403	2.796	0.095
	Within Groups	5129.662	996	5.15		
	Total	5144.065	997			
Hyperopia	Between Groups	0.115	1	0.115	0.178	0.673
	Within Groups	708.145	1098	0.645		
	Total	708.26	1099			
Astigmatism	Between Groups	4186.166	1	4186.166	2.813	0.094
	Within Groups	1633722.033	1098	1487.907		
	Total	1637908.199	1099			

Table 4: ANOVA analysis of prevalence of refractive error.

Discussion

This chapter focuses on presenting an in-depth discussion of the results. In this context, the results are widely discussed by comparing them with the previous literature used in the introduction to identify consistency and differences. Additionally, the discussion section will ensure that the findings address the research questions and objectives to achieve the main goals of the study.

The risk factors for the refractive error in patients

In this research, a variety of actions were taken to fulfil this objective. During the process of data collection and analysis, the patient's records were widely explored to determine the causative factors for the refractive errors, thus creating sufficient knowledge to attain the main objective. This research aimed at determining the prevalence and pattern of refractive error in patients presenting within ten (10) practices of a private optical company distributed throughout Trinidad and Tobago W.I. To achieve the main objective of the study, an in-depth

exploration of the risk factors for refractive errors was undertaken. The findings of the study reveal that refractive errors are prevalent across the population among people from different age groups. Refractive error is considered the main contributor to the high prevalence of visual impairment and subsequent blindness, especially when they are left uncorrected. The findings from this study further reveal that refractive error is prevalent among children and young adults while the adults remain less susceptible to the disorder. The results of this study are based on records of patients where most of them were aged 36-80 years of age. The findings of the study reveal that the prevalence of refractive error is relatively lower in populations across Trinidad and Tobago W.I. because the significance value is 0.223, which is fairly greater than the normal significance of 0.005. The findings of this study agree with Natung, et al. and Ramsewak, et al. [2,4] that there is a high prevalence of refractive errors among children due to the exposure to numerous risk factors compared to the adults and older populations.

The findings from this study further indicate that myopia prevalence is relatively lower in Trinidad and Tobago W.I. based on the records

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and wellbeing. The high prevalence of refractive errors among children is attributed to factors such as measles and vitamin deficiency which can be preventable. From this perspective, failure to correct childhood refractive errors causes further development and complications that result in adulthood refractive errors that are difficult to solve. Refractive error interventions among children are effective and successful because they possess an immature visual system that can be corrected at a later stage. Therefore, this study shows that the majority of the patients who visited the private optical company in different locations were mature adults and elderly people in Trinidad and Tobago, with the results showing a relatively lower prevalence and pattern of the refractive error.

Therefore, the low prevalence of myopia, hyperopia, and astigmatism among adults and elderly people is an indication of effective correction strategies for childhood visual complications.

This study demonstrates that there is a low prevalence of myopia, hyperopia, and astigmatism among the adults and elderly, while it remains high among the children due to causative factors such as genetic inheritance of the complication and exposure to risk factors that compromise with normal vision. In this regard, appropriate interventions are required to ensure that refractive errors are corrected at an early stage during childhood to improve the quality of life and participation in various activities. Despite the findings of the study showing relatively lower prevalence rates of refractive error among the patients who presented in private optical companies, which were mainly adults and the elderly, there is a need for further research regarding this subject to ascertain the pattern of the visual problem, given that it contradicts some previous studies and agrees with others.

Recommendations

For practice

Refractive errors are considered a significant health problem across the world, as presented in this study, especially when they are left uncorrected. They are associated with causing negative outcomes such as blindness and visual impairment. In this regard, the following recommendations should be applied to correct the current situation.