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Awareness of Common Ocular Conditions Among Trinidad Population: A Cross-Sectional Pilot Study

Ngozika E. Ezinne[1,2] | Akera Pope[1] | Moesha Tyson[1]

[1]Optometry Unit, Department of Clinical Surgical Sciences, University of the West Indies, Saint Augustine Campus, St. Augustine, Trinidad and Tobago | [2]Discipline of Optometry, University of KwaZulu-Natal, Durban, South Africa

Correspondence: Ngozika E. Ezinne (ezinne.ngozi@gmail.com)

Received: 26 December 2023 | **Revised:** 15 June 2024 | **Accepted:** 1 March 2025

Funding: The authors received no specific funding for this work.

Keywords: awareness | cataract | diabetic retinopathy | glaucoma | keratoconus | refractive error | strabismus | Trinidad

ABSTRACT

Background and Aims: Cataracts, glaucoma, diabetic retinopathy (DR), uncorrected refractive error (URE), and corneal anomalies are some of the leading causes of blindness and visual impairment (VI). Awareness of these ocular conditions and their consequences is crucial for early detection and management to prevent blindness. The study is aimed to assess the awareness of common ocular conditions among adults in Trinidad.

Methods: A cross-sectional study of Trinidad and Tobago (T & T) adults was conducted to determine their awareness of common ocular conditions. Data were collected face-to-face using a self-administered questionnaire and systematic random sampling. Awareness was defined as whether the respondent had ever heard of the ocular conditions. Knowledge, on the other hand, was assessed based on the respondent's understanding of various aspects of each condition, including its symptoms, risk factors, and management strategies.

Result: A total of 230 individuals aged 18 to 83 years participated in this study, with 146 (63.5%) being female. Majority of participants (69.1%) were under 30 years of age, and 63% had attained tertiary education. Cataracts had the highest awareness rate ($n = 226$, 98.3%), followed by glaucoma ($n = 184$, 80%). A significant association was found between age and awareness of diabetic retinopathy (DR) ($p = 0.01$), while sex was significantly associated with awareness of all ocular conditions, except for DR, glaucoma, and refractive errors (RE) (all $p > 0.05$). Level of education was significantly associated with awareness of DR ($p = 0.02$), and occupation was significantly associated with awareness of all ocular conditions, except cataracts and glaucoma ($p > 0.05$). The primary sources of information about ocular conditions were family, friends, and relatives ($n = 199$, 87%).

Conclusion: The level of awareness of the common ocular conditions among the T & T populations was comparable with the global findings. There is a need to increase awareness of DR and RE among the population to reduce the burden caused by these conditions.

1 | Introduction

More than 1.1 billion people are visually impaired at distance or near and approximately 1 billion of these cases are preventable or avoidable [1]. About 73% of them are above 50 years and 55% are females [1–3]. The number of people with visual impairment (VI) is projected to increase to 1.8 billion by 2050 [3]. Majority (90%) of those with visual impairments live in middle- or low-income countries where access to treatment is usually limited by awareness of the condition and services [2, 4].

In the Caribbean and Latin America, about 5000 and 20,000 in every 1 million of the population are blind and visually impaired, respectively [5]. The estimated prevalence of blindness in the Caribbean is three times higher than in the United States [6]. In T & T, the national survey showed that the prevalence of blindness is

1%, which translates to approximately 12,275 individuals out of 1.4 million T & T population [7]. Visual impairment affects economic, educational, social and quality of life of an individual [8, 9].

Major causes of visual impairment and blindness globally are uncorrected refractive errors (671 million people), cataract (100 million people), glaucoma (8 million people), age-related macular degeneration (8 million people), and diabetic retinopathy (4 million people) [1, 3, 10]. In T & T, the major causes of blindness are glaucoma (28.6%), cataract (25.7%), and diabetic retinopathy (DR) (11.4%). Additionally, uncorrected refractive error (URE) significantly contributes to visual impairment, affecting 44% of the population, while cataract remains a major cause of VI at 30.1% [7, 11]. Records from eye-care services in T&T revealed a high prevalence of keratoconus (KC), strabismus and night blindness. Hence, the need to assess the awareness of these ocular conditions in T&T population.

Understanding these ocular conditions and their potential consequences is critical for early detection and effective management to prevent vision loss. The awareness of common ocular conditions reported in various studies [10, 12, 13] varied. Developed countries typically demonstrate a higher levels of awareness, whereas most developing countries report lower awareness rates [10, 14, 15]. For instance, awareness levels for cataract and glaucoma were approximately 69% and 41% respectively [10]. In contrast, India reported awareness rates of only 3.2% for glaucoma and 27% for DR [14, 16]. Furthermore, health care professionals and individuals affected by these conditions exhibited higher awareness levels [17–20].

Various factors, including age, sex, education, economic status, geographical location, religion, and area of residence, have been reported to influence awareness of ocular conditions [13, 21, 22]. Limited research has specifically assessed awareness of common ocular conditions in the Caribbean, particularly in T & T. Consequently, this study aims to assess awareness levels of common ocular conditions among the population of T & T. The insights from this study can inform eye health promotion programs.

2 | Materials and Methods

2.1 | Ethical Approval

Ethical approval was obtained from the Research and Ethics Committee of the University of the West Indies (UWI) Saint Augustine Campus, T & T (CREC-SA.0725/01.2021). Information about the study, purpose of the study, and reasons for participating in the study were explained to the participants before data collection. Informed consent was obtained from all participants. No personal information of the participants was collected, and the participants were made completely aware of the option to leave the study at any stage.

2.2 | Study Setting

T & T is a high-income, twin island in the Caribbean with a population of 1.3 million comprising of 35.4% East Indians, 34.2% African and 22.8% mixed ethnicities [11, 23, 24] Education in T & T is free at the primary and secondary levels and is compulsory between the ages of 6 and 12, with a literacy rate of 98.7%. There is a network of public clinics and hospitals where treatments are provided free of charge [25]. Trinidad has 14 local government authorities, two city councils (Port of Spain and San Fernando), three borough councils (Arima, Chaguanas, and Point Fortin), and nine counties [25]. It has 12 major towns: Chaguanas, Mon Repos, San Fernando, Port of Spain, Rio Claro, Arima, Marabella, Laventille, Point Fortin, Tunapuna, Scarborough, and Sangre Grand [25].

2.3 | Study Design and Population

This study was a descriptive cross-sectional survey of awareness and knowledge of common ocular conditions among individuals aged ≥ 18 years residing in T & T.

2.4 | Sample Size

The sample size was calculated with a sample size generating software known as Raosoft using the Trinidad and Tobago populations [26]. According to Raosoft, for a population greater than or equal to 20,000 at a confidence level of 95%, the minimum expected sample was 377. The formula of the Rao software is given by the equation below, where n is the sample and E is the margin of error.

$$x = Z(c/100)2r(100 - r)$$

$$n = N\ \ x/((N - 1)E2 + x)$$

$$E = \mathrm{Sqrt}[(N - n)x/n(N - 1)]$$

2.5 | Inclusion and Exclusion Criteria

Individuals aged ≥ 18 years who had resided in T & T for at least 6 months were included. Those who could not fully comprehend the questions and those who found it difficult to answer them were excluded. In addition, Trinidad residents, who are eye care professionals, including ophthalmologists, optometrists, opticians, and ophthalmic nurses, were excluded.

Participants were asked questions regarding their medical history before completing the questionnaire. Patients with history of diabetes, hypertension, or heart disease were excluded from the study. In addition, ocular history was recorded to ensure that none of the participants had any of the studied ocular conditions (cataract, glaucoma, DR, URE, KC, strabismus, night blindness), as this may influence the results and increase the level of awareness of that condition.

2.6 | Data Collection Procedure

The self-structured questionnaire used in previous studies [10, 12] was modified, validated, and used in this study. The questionnaire was tested in a pilot group ($n = 20$) outside the

study area to assess the clarity, understanding, wording, and relevance of the survey questions. The questionnaire was modified after the pilot group was used in the study. The data from the pilot group were not included in the final analysis.

Six out of the 12 major towns from different regions in T & T including Port of Spain, Chaguanas, Arima, Sangre Grande, Marabella, and Laventille were randomly selected for the purpose of this study. The sample size (377) was divided into six to obtain the exact number of participants to be recruited from each town. The sample size was increased to 390 to obtain a random sample of 65 participants from each town. Each major town in T & T has town halls where people get their public transport bus tickets. For this study, town halls were used as locations for data collection. The town halls were used because they were always busy and filled with people.

Individuals aged ≥ 18 years, regardless of religion, sect, sex, and socioeconomic status (SES), and who were willing to take part in the study were selected at random from the townhalls in the six selected towns in T & T to participate in the study. To avoid bias participants were recruited at different times of the day to participate in the study. Systematic random selection was used to select every third person in the area where bus tickets were purchased. Where the selected participant declined or was not eligible to participate in the study, the 4th person on the queue was selected.

The questionnaire was administered to collect data on sociodemographics such as age, gender, occupation, and level of education. Awareness was assessed by asking the participants whether they had heard of seven ocular conditions, including cataract, glaucoma, DR, URE, KC, strabismus, and night blindness. Participants were then asked to complete a sect of questions assessing their awareness of the consequences (such as potential for causing blindness), symptoms, causes/risk factors, and treatment/management of the seven ocular conditions: glaucoma, cataract, DR, Night blindness, URE, KC, and strabismus. Additionally, participants were asked to identify sources of their awareness regarding these conditions with options including ophthalmologist, optometrist, family and friends, media, books, or the internet.

2.7 | Data Analysis

The data collected were entered into an excel spreadsheet and exported to the Statistical Package for Social Science (SPSS) version 24 for analysis. Descriptive statistics were used to summarize the variables. Univariate comparisons between awareness of each ocular disease and demography were performed using independent *t*-tests and χ^2 tests. A *p*-value of less than 0.05 was considered statistically significant.

3 | Results

3.1 | Demographics Profile of the Respondents

Two hundred and thirty individuals aged 18–83 years participated in this study, with 146 (63.5%) been females. Most (69.1%) participants were less than 30 years old, had tertiary education (63%), and were self-employed (28.7%) (Table 1).

3.2 | Awareness of Ocular Conditions

Table 2 shows the awareness of ocular conditions. Cataracts had the highest awareness rate ($n = 226$, 98.3%), followed by glaucoma ($n = 184$, 80%), and night blindness ($n = 115$, 50%). Most partiipants were aware of the symptoms, risk/causes, treatment, and consequences of cataracts and glaucoma. Our results showed that participants were least aware of KC, strabismus, and RE symptoms, causes, effects, and treatment.

3.3 | Association of Awareness of the Common Ocular Conditions With Demography

The level of awareness of common ocular conditions was highest among females, individuals in 18–30 age group, students, and those with postgraduate degrees (Table 3). A significant association was found between age and awareness of DR ($p < 0.05$). Sex was significantly associated with awareness of all ocular conditions except for DR, glaucoma, and RE (all $p > 0.05$). Additionally, a significant association was also found between level of education and awareness of DR ($p < 0.05$), while occupation was significantly associated with awareness of all ocular conditions, except cataract and glaucoma ($p > 0.05$).

TABLE 1 | Demographic profile of the participants ($N = 230$).

Variables	Frequency (%)
Sex	
Males	84 (36.5)
Females	146 (63.5)
Age	
18–30	159 (69.1)
31–43	44 (19.1)
44–56	12 (5.2)
57–69	11 (4.8)
70–82	3 (1.3)
≥ 83	1 (0.4)
Educational background	
Primary	10 (4.3)
Secondary	57 (24.8)
Tertiary	163 (70.8)
Occupation/status of employment	
Government employed	56 (24.3)
Privately employed	48 (24.4)
Self-employed	66 (28.7)
Unemployed	58 (25.2)

3.4 | Source of Information About Ocular Conditions

The major sources of information for most of the participants were family, friends, and relatives ($n = 199$, 87%), followed by the media ($n = 167$, 72.6%), and the Internet ($n = 137$, 60) (Table 4).

4 | Discussion

This study was the first to assess awareness of common ocular conditions in T & T. The findings indicate a high level of awareness of cataract, glaucoma and night blindness among the population. Notably, females, younger age groups, and individuals with tertiary education exhibited greater awareness of these conditions compared to others. The major sources of information about common ocular conditions were family, relatives, and friends.

Previous studies [12, 27] reported a higher awareness of common ocular conditions among females than males, which aligns with the findings of the present study. Contrary to our findings, studies in Saudi Arabia [22] and Nepal [28, 29] reported higher awareness of common eye conditions among males than females. These variations in findings could be due to cultural differences [22]. For instance, social restrictions on women in some countries, including Saudi Arabia, may limit their access to information about ocular conditions. Such cultural norms often prioritize males, potentially making them more exposed and aware of ocular conditions than females [22].

The high level of awareness reported among students and those with tertiary education in our study is similar to the findings of other studies [22] This is expected, as students and those with tertiary education are more equipped and have better access to educational resources and mass media than uneducated or less-educated ones.

Our study participants were more aware of cataracts and glaucoma than of other ocular conditions. This could be attributed to the high prevalence of cataract and glaucoma in T & T. Similar findings were recorded in Bangladesh [21] Nepal [28], Canada [30], and India [31]. It is not surprising that cataracts and glaucoma have a higher awareness than others because they are the major causes of blindness globally. However, poor awareness of glaucoma was recorded in studies in the USA, Switzerland, and Iran.

Previous studies [14, 30] recorded awareness of cataracts and glaucoma to be associated with age because they are age-related conditions. However, the current study did not find any significant correlation between awareness of cataracts and glaucoma with age. A study in Iran [21], and Switzerland [32] reported similar findings.

There was an overall low level of DR and RE awareness in the current study despite reports of a high prevalence of diabetes in T & T [25]. In contrast, a study [10] in Jordan reported higher awareness of DR than of cataract and glaucoma. The high prevalence of DR in Jordan could be the reason for the high awareness in that population. In addition, the level of awareness of strabismus and KC recorded in our study was low despite the high presentation of cases in eye clinics in T & T. These conditions might have high presentations in optometry clinics but are less prevalent than glaucoma and cataracts. It is

TABLE 2 | Awareness of the ocular conditions.

Variables	Yes (%)	No (%)
Have heard or familiar with the ocular conditions?		
Cataract	226 (98.3)	14 (1.7)
Glaucoma	184 (80)	46 (20)
DR	76 (33)	154 (67)
RE	49 (21)	181 (79)
Strabismus	55 (23.9)	175 (76.1)
KC	25 (10.9)	205 (89.1)
Night blindness	115 (50)	115 (50)
Consequences of the ocular condition (can lead to blindness)		
Cataract	141 (61.3)	89 (38.7)
Glaucoma	135 (58.7)	95(41.3)
DR	64 (27.8)	166 (72.2)
RE	34 (14.8)	196 (85.2)
Strabismus	32 (13.9)	198 (86.1)
Keratoconus	20 (8.7)	210 (91.3)
Night blindness	94 (40.9)	136 (59.1)
Awareness of the symptoms		
Cataract	141 (61.3)	89 (38.7)
Glaucoma	126 (58.7)	95 (41.3)
DR	30 (13.1)	200 (86.9)
RE	27 (14.8)	196 (85.2)
Strabismus	31 (13.9)	198 (86.1)
KC	21 (8.7)	210 (91.3)
Night blindness	67 (40.9)	136 (59.1)
Awareness of the causes/risk factor		
Cataract	135 (58.7)	95 (41.3)
Glaucoma	185 (80.4)	45 (19.6)
DR	82 (35.7)	148 (64.3)
RE	34 (14.8)	196 (85.2)
Strabismus	53 (23)	177 (77)
KC	41 (17.8)	189 (82.2)
Night blindness	74 (32.2)	156 (67.8)
Awareness of the treatment		
Cataract	191 (83)	39 (17)
Glaucoma	118 (51.3)	112 (48.7)
DR	59 (25.7)	171 (74.3)
RE	31 (13.5)	199 (86.5)
Strabismus	18 (7)	214 (93)
KC	41 (17.8)	189 (82.2)
Night blindness	179 (77.8)	51 (22.2)

TABLE 3 | Association of awareness of the common ocular conditions with demography.

Variables	Cataract no. (%)[a] *p*-value [b]	Glaucoma no. (%)[a] *p*-value [b]	DR no. (%)[a] *p*-value [b]	RE no. (%)[a] *p*-value [b]	Strabismus no. (%)[a] *p*-value [b]	Night blindness no. (%)[a] *p*-value [b]	Keratoconus no. (%)[a] *p*-value [b]
Sex							
Male	81 (35.2)	62 (27)	25 (10.9)	14 (6.1)	27 (11.7)	30 (13)	8 (3.5)
Female	145 (63) $p = 0.05$	122 (53)	51 (22.2)	35 (15.2)	28 (12.2) $p = 0.03$	85 (37) $p = 0.001$	17 (7.4)
Age							
18–30	156 (67.8)	128 (55.7)	47 (20.4) $p = 0.01$	38 (16.5)	38 (16.5)	84 (36.5)	20 (8.7)
31–43	44 (19.1)	33 (14.3)	16 (7)	7 (3)	8 (3.5)	18 (7.8)	3 (1.3)
44–56	12 (5.2)	9 (3.9)	10 (4.3)	3 (1.3)	2 (0.9)	7 (3)	2 (0.9)
57–69	10 (4.3)	11 (4.8)	3 (1.3)	1 (0.4)	6 (2.6)	6 (2.6)	0 (0)
70–82	3 (1.3)	2 (0.9)	0 (0)	9 (3.9)	1 (0.4)	0 (0)	0 (0)
> 83	1 (0.9)	1 (0.4)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Occupation							
Government employed	56 (24.3)	47 (20.4)	12 (5.2)	6 (2.6)	8 (3.5)	26 (11.3)	4 (1.7) $p = 0.04$
Self-employed	56 (24.3)	54 (23.5)	19 (8.3)	14 (6.1)	10 (4.3)	28 (12.2)	3 (1.3)
Privately employed	45 (19.5)	35 (14.3)	18 (7.4)	1 (0.9)	20 (8.7)	17 (7.4)	6 (2.6)
Unemployed	57 (24.8)	47 (20.8)	26 (11.3) $p = 0.01$	25 (10.9) $p = 0.03$	17 (7.4) $p = 0.03$	42 (18.3) $p = 0.001$	12 (5.2)
Level of education							
Primary	10 (4.3)	9 (3.9)	2 (0.9)	0	4 (1.7)	2 (0.9)	0 (0)
Secondary	54 (23.5)	44 (19.1)	21 (9.1)	6 (2.6)	13 (5.7)	27 (11.7)	3 (1.3)
Tertiary	162 (70.4)	131 (57.0)	53 (23.0) $p = 0.02$	43 (18.7)	38 (14.5)	86 (37.4)	22 (9.5)

[a]Number/% of participants who answered 'yes' for being aware of the disease.
[b]Significance of the association between subject demographics and awareness of the diseases.

TABLE 4 | Source of information about ocular conditions ($N = 230$).

Sources of information	Frequency	Percentage
Family, friends, and relatives	199	87
Media e.g., TV, radio	167	72.6
Internet	137	60
Books, newspaper, magazines	108	47
Eye clinic including optometry and ophthalmology clinic	99	43

recommended that eye care practitioners educate patients about the conditions and consequences of the condition to reduce the burden of visual impairment.

Most of our study participants were more aware of the symptoms, risk factors, and management of glaucoma and night blindness than other ocular conditions. This could be due to education, high media coverage and prevalence of the condition when compared with others. Contrary to our findings, studies in Nepal [29], the USA, Switzerland, and Iran [12] reported low knowledge of glaucoma. Socioeconomic differences among the countries could be the reason for the variation in the findings. The need for greater public awareness of other ocular conditions is highly recommended.

Education level was found to be significantly associated with awareness of DR, with people with tertiary education being more aware of DR than others. In addition, awareness of DR, strabismus, KC, and night blindness were significantly associated with occupation and employment status. This is expected, as people with a higher education are expected to be well informed. In addition, people with higher levels of education usually have better economic status in society, which makes it easier for them to access eye services. Similar findings have been reported in studies in Iran [12] and India [33]. However, a study in Jordan [10] reported no significant association with the level of education, as people with lower levels of education were more aware of cataract and glaucoma. Eye health education of people from different socioeconomic statuses regarding these common ocular condition consequences to improve eye health seeking practices is necessary to reduce the burden of common ocular conditions globally.

The major sources of information in our study -Family, relatives, and friends align with findings from studies in Ethiopia, Germany, and Iran [12]. In contrast, studies in Switzerland and rural India recorded ophthalmologists and the media as the major sources of information [12]. These differences highlight a gap in ocular health education, particularly in T & T, as eye care practitioners were noted as the least source of information in the current study. This suggest a need for greater engagement by eye care practitioners in educating patients about ocular conditions during consulatations.

5 | Limitations and Strengths

Our study has some limitations that should be considered. The sample size in our study was small, which may not be a full representation of the entire population, thus limiting the generalizability of our study findings. In addition, recall bias could have influenced the results as the study relied on self reported data from participants. Futhermore, the use of terms such as refractive error, keratoconus, and strabismus may have impacted participant's awareness as these terms may not be widely recognized by the general public. Despite these limitations, our study was conducted face-to-face, and it was the first to provide insight into the awareness of common ocular conditions in T & T and the Caribbean. These findings could be instrumental in shaping future eye health promotion programs in the region.

6 | Conclusion

The level of awareness of the common ocular conditions among the T & T populations was comparable with the global findings. There is a need to increase awareness of DR and RE among the population to reduce the burden caused by these conditions.

Author Contributions

Ngozika E. Ezinne: conceptualization, methodology, formal analysis, writing – original draft, writing – review and editing, validation, supervision. **Akera Pope:** conceptualization, methodology, data curation, investigation, formal analysis, visualization. **Moesha Tyson:** conceptualization, methodology, data curation, formal analysis, investigation, project administration.

Acknowledgments

The authors have nothing to report.

Ethics Statement

Permission to conduct the study was obtained from the University of the West Indies research and ethics committee. Written consent was obtained from all participants before data collection.

Conflicts of Interest

All authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data is not publicly available due to privacy or ethical restrictions.

Transparency Statement

The lead author Ngozika E. Ezinne affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

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