



PREVALENCE AND COEXISTENCE OF GLAUCOMA, CATARACT, AND DRY EYE DISEASE AMONG CIVIL SERVANTS IN IMO STATE SECRETARIAT, NIGERIA: A CROSS-SECTIONAL STUDY

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ABSTRACT

Glaucoma, cataract and dry eye disease are leading causes of visual morbidity globally and commonly coexist in middle-aged and older persons. However, there is paucity of information on their coexistence among the occupational populations in Nigeria. The study investigated the prevalence of glaucoma and its co-morbidity with cataract and dry eye disease among public officials in Imo State Secretariat, Owerri, Nigeria. Descriptive cross sectional study was conducted among 380 public personnel aged 35-65 years selected using multi stage sampling. All participants got a complete ophthalmic examination including visual acuity, intraocular pressure, ophthalmoscopy and Schirmer's test. Descriptive statistics were used for data analysis using SPSS version 23. Glaucoma, cataract, and dry eye disease were diagnosed in 30 (7.9%), 68 (17.9%), and 144 (37.8%) patients, respectively. Glaucoma, cataract and dry eye disease co-existed in eight subjects (2.1%). Dry eye disease was the most prevalent ocular illness. Results showed a significant burden of ocular illnesses especially dry eye disease among civil servants. Occupational health services should include regular workplace eye screening programmes and periodic complete ocular examinations to enable early diagnosis and timely action.

KEYWORDS: Glaucoma; Cataract; Dry Eye Disease; Ocular Co-morbidity; Occupational Health; Nigeria.

INTRODUCTION

Visual impairment is a prominent cause of disability worldwide and has substantial effects for the well-being of the individual, productivity and socioeconomic growth. Visual impairment has many avoidable or treatable causes and ocular disorders remain a major public health burden, particularly in poor and middle-income countries where access to comprehensive eye care services remains low.^[1] Recent global estimates suggest that over 1 billion individuals live with preventable or uncorrected vision impairment, with cataract, glaucoma, refractive errors, diabetic retinopathy and age-related macular degeneration being the most common causes. Sub-Saharan Africa bears a disproportionate burden of this due to poor awareness, late diagnosis, inadequate screening initiatives and inequitable access to specialist ophthalmic care.^[2]

Glaucoma is still the primary cause of irreversible blindness worldwide among the major causes of visual loss. Glaucoma is a complex collection of progressive optic neuropathies characterised by irreversible degradation of retinal ganglion cells and loss of visual field. It is sometimes called to as the "silent thief of sight" since in most cases it is asymptomatic until it reaches an advanced stage. Although reducing intraocular pressure is an effective measure to halt disease progression, vision loss due to glaucoma is irreversible if the optic nerve is damaged.^[3] Thus, the mainstay of control techniques of glaucoma is early detection and lifelong care. Recent global evaluations have reconfirmed that glaucoma remains a major cause of blindness despite improvements in diagnostic technologies and treatment modalities^[4]. Glaucoma is very common in Africa, with earlier start, faster development and higher rates of blindness in people

of African descent compared with many other populations. This disparity is contributed by genetic predisposition, socioeconomic constraints, poor awareness and restricted access to specialised eye care services. Nigeria has one of the highest incidences of glaucoma in the world, with surveys of the population showing that about 5% of the adult population over the age of 40 years had the illness. Alarming, most affected persons are undiagnosed until irreversible loss of vision has occurred, underscoring the need for population-based screening and an increase in glaucoma awareness.^[5]

Cataract is the primary cause of reversible blindness in the world and a huge challenge to public health in developing countries. It is characterised by progressive opacification of the crystalline lens with gradual decrease of visual acuity and contrast sensitivity. Despite the high effectiveness of cataract surgery, late presentation, budgetary constraints and poor surgical coverage remain barriers to therapy in many African countries.^[6] Cataract frequency increases dramatically with age and is frequently comorbid with glaucoma because both diseases share overlapping age-related and environmental risk factors. Moreover, glaucoma can complicate cataract management through delayed diagnosis or disease progression after surgery, hence increasing the complexity of patient care.^[7]

Dry eye illness has also become one of the most prevalent ocular surface diseases in the world. It is a multifactorial disease with loss of homeostasis of the tear film, ocular surface inflammation, tear film instability, hyperosmolarity and neurosensory abnormalities. Patients often complain of ocular discomfort, burning, fluctuations of vision, photophobia, foreign body sensation and visual tiredness. Dry eye rarely causes blindness but has a significant impact on vision-related quality of life and work productivity, as well as health care utilisation. Recent meta-analyses estimate that over one-third of the global population has some degree of dry eye illness, with the highest prevalence in Africa and in people >40 years old.^[8]

Coexistence of glaucoma, cataract and dry eye disease has increasingly been recognised as a clinically relevant form of ocular multimorbidity. These conditions often coexist, owing to a number of shared risk factors, including old age, chronic ocular inflammation, systemic diseases such as diabetes and hypertension, prolonged exposure to environmental pollutants and long-term use of preserved topical antiglaucoma medications.^[9] Specifically, long-term use of benzalkonium chloride-containing glaucoma medicines has been linked to tear film instability and ocular surface disease, increasing the prevalence and severity of dry eye in patients with glaucoma. The coexistence of various problems affects the diagnosis, decreases adherence to treatment, degrades the visual function and dramatically reduces the quality of life of patients.^[10]

An important but largely neglected aspect of ocular health is the occupational environment. Civil workers are a huge work force, whose everyday duties increasingly involve prolonged computer use, intensive near-vision tasks, reduced blink frequency, prolonged indoor work, and continual exposure to air-conditioned environments. These professional features place employees at the risk of ocular surface disorders, digital eye strain, and visual tiredness while possibly aggravating pre-existing age-related ocular diseases. Visual impairment in government personnel can have a detrimental impact on workplace productivity, manifested in increased absenteeism, presenteeism, decreased work efficiency, hampered decision-making, and a poor quality of life. Therefore, the importance of preserving best possible ocular health is not only for human well-being but also for the productivity of institutions and economic development.^[11]

Ocular multimorbidity is being increasingly recognised globally, although research on the coexistence of glaucoma, cataract and dry eye disease among occupational populations in Nigeria is sparse. Most ophthalmic studies in Nigeria have been confined to a single eye illness or hospital-based patient group, thereby leaving an essential gap in understanding about the epidemiology of ocular comorbidities among apparently healthy working persons. Data on the burden of these co-existing illnesses are needed to influence workplace health policies, promote preventative eye care programmes and educate occupational screening strategies.^[12]

Therefore, this study was designed to investigate the prevalence of glaucoma and its co-existence with cataract and dry eye illness among civil personnel in Imo State Secretariat, Owerri, Nigeria. The findings are expected to provide baseline epidemiological evidence to inform targeted workplace eye health interventions, encourage early detection of ocular diseases, and contribute to the strategies to reduce preventable visual impairment among working age adults in Nigeria.

MATERIALS AND METHODS

Study Design

This study employed a descriptive analytical cross-sectional design to determine the prevalence of glaucoma and its comorbidity with cataract and dry eye disease among civil servants working in the Imo State Secretariat, Owerri, Nigeria. The cross-sectional design was considered appropriate because it permits the assessment of disease prevalence and the coexistence of ocular disorders within a defined population at a specific point in time.

Study Area

The study was conducted at the Imo State Secretariat, Owerri, the administrative headquarters of the Imo State Government in southeastern Nigeria. The Secretariat is located in New Owerri and serves as the central administrative hub for government activities within the state. It comprises thirty-two ministries, departments, and

agencies, including the Ministries of Justice, Agriculture and Food Security, Water Resources, Transport, Health, Education, Works, and Special Projects, as well as the Imo State Civil Service Commission, Hospital Management Board, and Board of Internal Revenue. The Secretariat houses thousands of civil servants engaged primarily in office-based administrative duties involving prolonged reading, writing, and computer use, making it an appropriate setting for investigating age-related ocular disorders and ocular surface diseases among working adults.

Study Population

The study population comprised civil servants aged 35–65 years working in the randomly selected ministries within the Imo State Secretariat. According to the 2024 personnel records obtained from the Imo State Civil Service Commission, the Secretariat had an estimated workforce of 7,800 employees distributed across thirty-two ministries and government agencies. Participants were recruited from ten ministries selected through a multistage sampling procedure.

Ethical Considerations

Ethical approval for the study was obtained from the Ethics Committee of the Department of Public Health, Imo State University, and administrative approval was obtained from the Ministry of Health at the Imo State Secretariat before commencement of the study.

Participation was entirely voluntary. Written informed consent was obtained from all participants after explaining the objectives, procedures, potential benefits, and minimal risks associated with the study. Participants were informed of their right to withdraw from the study at any stage without any adverse consequences. Confidentiality and anonymity were maintained by assigning unique identification codes to participants, and all information obtained during the study was treated with strict confidentiality and used solely for research purposes.

Sample Size Determination

The minimum sample size was determined using the Yamane formula for finite populations

$$n = \frac{N}{1 + N(e)^2}$$

where:

- n = required sample size
- N = target population (7,800)
- e = level of precision (0.05)

Substituting the values:

$$n = \frac{7800}{1 + 7800(0.05)^2}$$

$$n = \frac{7800}{20.5} = 380.5$$

The calculated sample size was approximately 380 participants. Consequently, a total of 380 civil servants were recruited for the study.

Sampling Technique

A multistage sampling technique was employed to ensure adequate representation of civil servants across the Secretariat.

In the first stage, all thirty-two ministries within the Secretariat were considered sampling clusters. Ten ministries were selected using simple random sampling through the balloting method.

In the second stage, employees within each selected ministry were stratified into four occupational cadres according to their employment grade.

In the third stage, participants were selected from each cadre using stratified random sampling followed by simple random sampling. Eligible workers within each stratum were selected by balloting, ensuring that every civil servant had an equal probability of participation. Recruitment continued until the calculated sample size of 380 participants was attained.

Eligibility Criteria

Inclusion Criteria

Participants were eligible for inclusion if they

- were civil servants aged 35 years and above;
- had been employed in the civil service for at least two years;
- had no previous history of ocular trauma;
- had not undergone recent ocular surgery; and
- provided written informed consent to participate in the study.

Exclusion Criteria

Participants were excluded if they

- were younger than 35 years;
- had worked in the civil service for less than two years;
- had a history of ocular trauma;
- had undergone recent ocular surgery; or
- declined participation in the study.

Data Collection Instruments

Data were collected using a structured interviewer-administered questionnaire and comprehensive ophthalmic examinations.

Questionnaire

A structured questionnaire developed by the researchers was used to obtain information from participants. The questionnaire consisted of two sections.

Section A collected socio-demographic characteristics, including age, sex, and occupational information.

Section B obtained information regarding participants' ocular health status, previous eye conditions, and relevant medical history.

Ophthalmic Examination

Comprehensive eye examinations were conducted by qualified optometrists using standardized ophthalmic instruments, including

- Hand-held visual acuity card
- Snellen visual acuity chart
- Pen torch
- Direct ophthalmoscope
- Tonometer
- Schirmer strips

Visual acuity testing was performed using the Snellen chart. External examination of the eyes was carried out using a pen torch, while fundus examination was conducted using a direct ophthalmoscope. Intraocular pressure was measured with a calibrated tonometer. Tear secretion was assessed using the Schirmer strip test to identify participants with dry eye disease.

Validity of the Instrument

The questionnaire was developed following an extensive review of relevant literature and was subjected to face and content validation by two senior consultant optometrists with expertise in clinical eye care and ophthalmic research. The experts evaluated the questionnaire for clarity, relevance, appropriateness of content, and its ability to adequately capture information required to achieve the study objectives. Their recommendations were incorporated before commencement of data collection.

Reliability of the Instrument

The reliability of the questionnaire was assessed through a pilot study involving thirty civil servants from the Abia State Secretariat, who possessed characteristics similar to the target study population but were not included in the final study. Internal consistency was evaluated using

Cronbach's alpha reliability coefficient, which yielded a value of 0.78, indicating acceptable reliability of the instrument.

Data Collection Procedure

Data collection commenced after obtaining informed written consent from eligible participants. Trained research assistants administered the questionnaires through face-to-face interviews and assisted participants in clarifying questions where necessary to ensure accurate responses.

Following questionnaire administration, each participant underwent a comprehensive ophthalmic examination conducted by a licensed optometrist. The examination included assessment of visual acuity, external ocular examination, ophthalmoscopy, measurement of intraocular pressure using a tonometer, and Schirmer strip testing for the assessment of tear production. Standard examination procedures were maintained throughout the study to ensure consistency and reduce measurement bias.

Statistical Analysis

Completed questionnaires were checked daily for completeness and accuracy before data entry. Data were coded and entered into the Statistical Package for the Social Sciences (SPSS) version 23.0 (IBM Corp., Armonk, NY, USA) for analysis.

Descriptive statistics were used to summarize the study variables. Continuous variables were summarized using appropriate measures of central tendency and dispersion where applicable, while categorical variables were presented as frequencies and percentages. The prevalence of glaucoma, cataract, dry eye disease, and their coexistence was calculated and reported accordingly.

RESULTS

Table 1 Sociodemographic Characteristics of despondence (n= 380)

Variable	Category	Frequency(n=380)	Percentage
Age Group (years)	35 - 44	127	33.4%
	45 - 54	164	43.2%
	55 - 65	89	23.4%
Gender Distribution			
Male		174	46.8%
Female		198	53.2%

Socio-demographic factors of Study Participants (N=380).

Table 1 above shows that a total of 380 participants were involved. Most (43.2%) respondents were within the age

range of 45 -54 years, 33.4% of them were aged 35 -44 , while 23.4% of them were aged 55- 65 years. Females constituted a higher proportion 53.2% of participants while males were 46.8%.

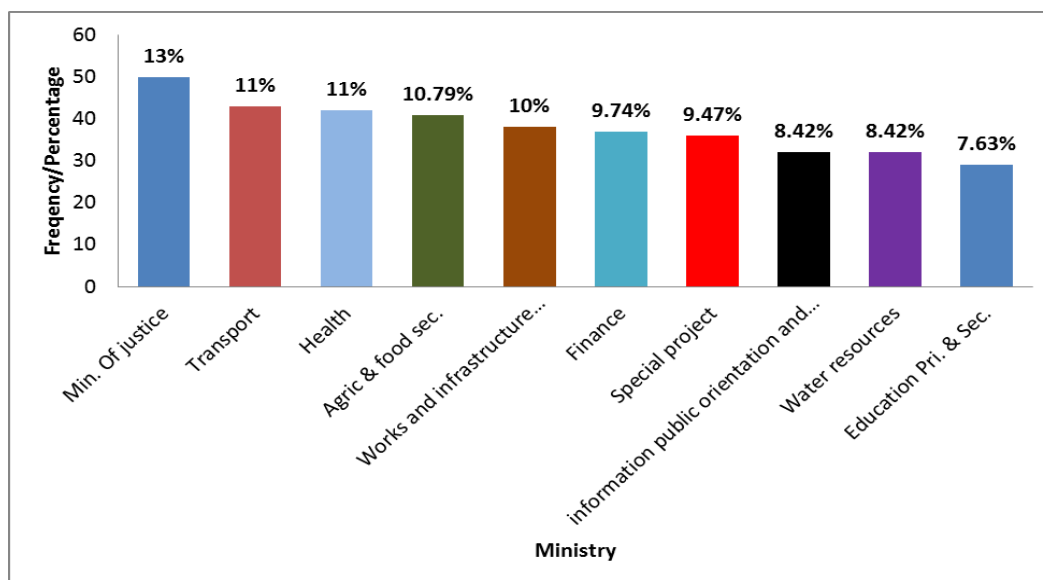


Figure 1 Ministry Distribution of Participants.

Figure 1. above, shows the distribution of participants across ministries. The highest proportion of respondents were from the Ministry of Justice (13.16%), followed by the Ministry of Transport (11.32%), Ministry of Health (11.05%), and Ministry of Agriculture and Food Security (10.79%). Participants from Works and Infrastructure

Development (10.00%) and Finance (9.74%) were also well represented. Smaller proportions were drawn from Special Projects (9.47%), Information, Public Orientation and Strategy (8.42%), Water Resources (8.42%), and Education (Primary and Secondary) (7.63%), indicating broad representation across government sectors.

Table 2: Frequency of Glaucoma comorbidity with cataract and dry eye.

Comorbidity	Frequency (n)	Percentage (%)
Glaucoma	30	7.89
Cataract	68	17.90
Dry eye	144	37.75
Glaucoma + Cataract + Dry eye	8	2.10

Table 2 above, shows that out of the 380 participants, Dry eye disease emerged as the most prevalent condition, affecting 37.8% (n = 144) of participants followed by cataract, 17.9% (n = 68), and glaucoma was comparatively less frequent at 7.9% (n = 30) of participants. The prevalence of the triple comorbidity (presence of glaucoma, cataract, and dry eye simultaneously) was observed in 2.1% (n = 8) of participants.

DISCUSSION

The frequency of glaucoma and its conjunction with cataract and dry eye disease among civil servants in the Imo State Secretariat, Owerri, Nigeria was studied. Glaucoma, cataract and dry eye disease were present in 7.9% (n = 30), 17.9% (n = 68) and 37.8% (n = 144) of the participants respectively. The co-existence of all three disorders (glaucoma, cataract and dry eye disease) was found in 2.1% (n = 8) of the individuals. These findings indicate the heavy incidence of eye problems among middle-aged and older working persons and the need for the inclusion of comprehensive eye care in occupational health programmes.

Dry eye illness was the most common eye problem diagnosed in this study, involving >1/3 of the sample population. This finding is similar with prior research that showed an increasing prevalence of dry eye illness among office workers, mostly due to prolonged use of digital gadgets, decreased blinking rate, prolonged near-vision tasks, and exposure to air-conditioned indoor environments.^[13] Public officials spend lengthy periods of time working on computers which may increase tear film evaporation and contribute to ocular surface instability. The majority of study participants were adults 45 years of age and older. Age related physiological changes in tear production may have also contributed to the high prevalence. The high burden of dry eye illness has substantial professional implications as persistent ocular discomfort, impaired vision and visual fatigue may compromise work performance, lower productivity and adversely influence quality of life.^[14]

Cataract was the second commonest eye disease 17.9%. This is akin to findings from sub-Saharan Africa where cataract remains one of the primary causes of visual impairment among adults, particularly in low- and middle-income nations when timely surgical intervention may be

limited.^[15] Cataract is an age-related illness mostly caused by progressive lens opacification. However, environmental factors, ultraviolet radiation, metabolic problems, smoking and systemic diseases can accelerate its development. The relatively high prevalence found in this economically active population suggests that visual impairment related to ageing may begin before retirement, highlighting the need for routine ophthalmic screening to enable early diagnosis and timely referral for cataract surgery where indicated.^[16]

The prevalence of glaucoma in this sample was 7.9%, which is higher than the pooled global estimates of primary open-angle glaucoma in the general adult population, which is usually between 3% and 5%, depending on age, ethnicity, and geographic location.^[17] This increased frequency is not surprising considering the known greater genetic predisposition to glaucoma, earlier illness onset and more severe disease progression than many other communities of African descent.^[18] The study population included adults aged between 35 and 65 years, an age range during which the prevalence of glaucoma grows progressively. The prevalence reported in the present study is consistent with community-based screening data and is likely to be a more representative estimate of the disease burden in apparently healthy working adults than hospital-based studies in Nigeria where patients are recruited from specialist eye clinics and prevalence estimates are often substantially higher.^[19]

One striking observation of the study was that 2.1% of the individuals had triple ocular co-morbidity of glaucoma, cataract and dry eye syndrome. The proportion was very minor, but the clinical relevance should not be disregarded. The presence of more than one eye condition may have additive or synergistic impact on visual impairment, diagnostic complexity, therapeutic burden and overall quality of life. Glaucoma patients are commonly on long-term topical treatments, particularly those containing preservatives like benzalkonium chloride, which have been related with ocular surface toxicity and the initiation or worsening of dry eye disease. Similarly, cataract may be comorbid with glaucoma as both illnesses are more common with age and have common risk factors such as systemic vascular disease and oxidative stress.^[20] Therefore, patients with numerous ocular diseases usually need interdisciplinary care and more intensive clinical follow-up to achieve the best possible visual results.

The findings of this study add to the growing evidence base indicating ocular multimorbidity as an emergent public health problem in ageing populations. Most prior studies have focused on either glaucoma, cataract or dry eye disease as separate illnesses. And very few studies have explored the coexistence of these diseases among occupations in sub-Saharan Africa.^[21] The ocular multimorbidity among seemingly healthy government workers highlights the need for routine workplace health assessments to go beyond visual acuity tests and include

thorough ophthalmic examinations capable of detecting several coexisting eye illnesses. Early detection of these disorders may prevent needless visual impairment, enhance treatment outcomes and lessen the long-term socio-economic burden associated with vision loss.^[22]

Overall, the data show general agreement with prior epidemiological research revealing a significant incidence of dry eye illness among office workers and the ongoing prevalence of cataract and glaucoma in African populations.^[24] Small variances in the prevalence estimates between studies are likely to be due to changes in research populations, diagnostic criteria, age distributions, occupational exposures, and sampling procedures. The relatively high prevalence of dry eye disease found in this study may be explained plausibly by prolonged use of digital devices and indoor working conditions, while the glaucoma prevalence observed reflects the well-documented increased susceptibility in people of African descent.

Despite its strengths, this study has a number of disadvantages. Because of the cross-sectional design, causal inference between occupational exposures and ocular diseases is not possible. Also, the recruitment of participants only from one state secretariat may limit the generalisability of the findings to other occupational groups in Nigeria. Additionally, only descriptive analyses were conducted, therefore relationships between participant characteristics and ocular disorders could not be explored. However, the study offers useful baseline epidemiological data on the prevalence and coexistence of major ocular disorders among Nigerian civil servants and highlights the need for larger multicentre studies with analytical approaches to identify predictors of ocular multimorbidity.^[24]

CONCLUSION

The study showed a heavy burden of eye illnesses among civil servants at the Imo State Secretariat, Owerri, Nigeria. The most prevalent ailment was dry eye disease, followed by cataract and glaucoma, with a tiny but clinically relevant proportion of people having concomitant glaucoma, cataract, and dry eye disease. The findings emphasise the importance of comprehensive occupational eye health plans with an emphasis on early diagnosis, timely referral and proper care of ocular illnesses.

The long-term burden of avoidable visual impairment could be reduced and early diagnosis facilitated by including periodic comprehensive eye examination, visual health education, ergonomic workplace interventions and routine ophthalmic screening in pre-employment and periodic medical fitness assessment among civil servants. Such interventions can improve visual health, boost productivity at the workplace and contribute to higher quality of life among government employees.

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