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Prevalence of ocular hyperopia and associated factors among patients receiving eye care services at Jinja regional referral hospital. A cross-sectional study.

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Abstract

Background:

Hyperopia is a common refractive error where distant objects are seen more clearly than near ones. Its prevalence varies across age groups, with higher rates among children and older adults. Therefore, this study aimed to determine the factors associated with the prevalence of ocular hyperopia among patients receiving eye care services at Jinja Regional Referral Hospital.

Methodology:

A descriptive cross-sectional approach with a sample of 40 patients, data were collected through questionnaires and analyzed to determine the frequency, demographic influences, risk factors, and management approaches for hyperopia using Microsoft Excel.

Results:

Indicated a high prevalence rate of people with hyperopia more common among patients aged 16 – 30years, 16(40%), and prevalence being more in the female gender, 24(60%), than the male 16(40%). 27(67.5%) of hyperopic cases were from rural areas, highlighting potential socioeconomic and accessibility barriers. Family history emerged as a significant risk factor, with 26(65%) of hyperopic patients reporting relatives with the condition, underscoring genetic predisposition. Outdoor activities were common among patients, yet did not appear to reduce the prevalence of hyperopia significantly. 26(65%) of patients relied on prescription eyeglasses, while only 5(12.5%) used contact lenses and 3(7.5%) opted for refractive surgery, likely due to economic constraints and limited access to advanced treatments.

Conclusion:

This study indicated a high prevalence of hyperopia among patients at Jinja Regional Referral Hospital, with significant associations to demographic and genetic factors.

Recommendations:

Implementation of regular eye screening programs, especially in rural areas, to facilitate early detection of hyperopia among those with limited access to health care.

Keywords: *Ocular Hyperopia, Eye Care Services, Jinja Regional Referral Hospital, Jinja district.*
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Background of the study

Ocular hyperopia, commonly referred to as farsightedness, is a prevalent refractive error characterized by the ability to see distant objects more clearly than nearby ones. This condition arises when the eyeball is shorter than the average or when the cornea has insufficient curvature, resulting in light rays focusing behind the retina instead of directly on it. While hyperopia is a widespread refractive error globally, its prevalence varies among different populations, influenced by factors such as genetics, environmental factors, and socioeconomic status.

Understanding the prevalence of ocular hyperopia is paramount for several reasons. Firstly, it provides valuable insights into the burden of refractive errors within the catchment area of Jinja Regional Referral Hospital, informing health care planners and policymakers about the magnitude of the issue. Secondly, it aids in the allocation of resources and development of the targeted interventions to address the specific needs of individuals with hyperopia.

Additionally, by identifying the prevalence of ocular hyperopia, clinicians can tailor their approaches to early detection, management, and treatment, thereby enhancing visual outcomes and reducing the risk of associated complications.

Globally, the study done by the World Health Organization (WHO) on 1/3/2018, about the prevalence of ocular hyperopia showed, in children, the EPP of hyperopia was 4.6%. The EPP of hyperopia ranged from 2.2% in Southeast Asia to 14.3% in the Americans. In the adults, the EPP of hyperopia was 30.9%. The EPP of hyperopia ranged from 23.1% in Europe to 38.6% in Africa and 37.2% in the Americas. (Hashemi et al, 2017)

Continental, the study was conducted in Motherwell township, Eastern Cape province, South Africa. Shows that, in children, the prevalence of hyperopia was 25.2%. Hyperopia ranged from +0.50D to +3.62D in the right eyes with a mean of -0.17+-1.7D. In the left eyes, hyperopia ranged from +0.50D to +2.62D with a mean of -0.12 +-1.7D. (Denis Plotnikov, 2021)

In East Africa, a study conducted on school-going adolescents in Kakemega County, Kenya (2024), found that the prevalence of hyperopia was 23%, and hyperopia was more common in males than females.

Lastly, in Uganda, a study carried out at Mulago National Referral (2023) on 188 study participants, the majority were male 54.8%, and the majority of the participants were at the primary level of education. The median age was 11years. The prevalence of hyperopia was 11.3%. (Agaba, 2023)

Despite the considerable impact of refractive errors on visual health and quality of life, access to comprehensive eye care services remains limited in many parts of Uganda, particularly in rural and underserved areas. Jinja regional referral stands as the pivotal institution in the provision of eye care services, serving a diverse population across the region. However, there is a paucity of data regarding the prevalence of ocular hyperopia among patients seeking eye care at this facility. Therefore, this study aimed to determine the factors associated with the prevalence of ocular hyperopia among patients receiving eye care services at Jinja Regional Referral Hospital.

Methodology

Study design

The study used a descriptive cross-sectional study design applying a quantitative method to assess the prevalence of ocular hyperopia among patients receiving health care in JRRH.

Study area

The study area was the eye clinic of Jinja Regional Referral Hospital and the eye ward. The hospital is located in the eastern part of Uganda, not far from the source of the Nile in the centre of Jinja. The hospital serves approximately a population of 4.5 million in a catchment area comprising 1city and 11 districts (Jinja city, Jinja, Iganga, Kamuli, Mayuge, Namutumba, Bugweri, Buyende, Luuka, Kaliro, Namayingo, and Bugiri). The hospital also serves the neighbouring districts of Mukono, Buikwe, Kayunga, Buvuma, Busia, and Tororo, among others. The hospital is located approximately 84 kilometres (52mi) east of Mulago National Referral Hospital.

Study population

The study comprised all ocular hyperopia patients receiving eye care at Jinja regional referral hospital at the eye clinic during the period of study.

Sample size determination

The sample size was determined using Button's 1995 method below.

Sample size, **S**=GR/O

Where **s**=sample size,

G = Number of people interviewed per day.

R =Maximum number of days for data collection.

O= Maximum time an interviewer spends on each patient.

G=4 people

R=5 days

O= (30/60) =0.5 Hours

Therefore, s = (4x5)/0.5=40 respondents

Sampling technique

A non-probability convenience sampling process was used since a specific group of patients with ocular hyperopia was required among patients receiving health services at JRRH.

Sampling procedure

A purpose sampling technique was used to select the subjects, where only subjects with ocular hyperopia, as well as caretakers, were selected among patients receiving eye care services.

Selection criteria

Inclusion criteria

All patients and caregivers of children with signs and symptoms of ocular hyperopia receiving eye care services at JRRH and who consented to take part in the study were included in the study.

Exclusion criteria

Patients with ocular hyperopia who failed to consent were excluded, and those with ocular hyperopia who were not receiving eye care at JRRH were also excluded.

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Data collection method
The principal investigator used interviews as the method of data collection, using an interview guide with well-structured questions.
All clinicians at the JRRH eye clinic were sensitized and requested to identify the participants with Age-related Macular Degeneration and other eye conditions.

Data collection tool(s)
A questionnaire filled in by the researcher or a research assistant was used to collect data from the respondents.

Data collection procedure
Rapport was created with the respondents and reassuring them about confidentiality by assigning unique numbers. The questions were read thoroughly, clearly, and interpreted for the respondents to understand. Responses were given in local languages and written in English by the principal investigator.

Data quality control
This was done through the review of data by other senior ophthalmologists to improve the authenticity of the data collected.

Pre-testing
Questionnaires were pre-tested for completeness and reliability on four patients in the JRRH eye clinic.

Data processing, analysis, and presentation
After collecting data, it was processed quantitatively by tallying and was presented by narration, use of tables, bar graphs, and pie charts.

Ethical consideration
Introductory Letter
On approval of the research proposal by the school, a letter of introduction was provided by the school administrator. Then it was delivered to the hospital director of JRRH, who introduced the letter to the person in charge of the JRRH eye department.

Informed consent
Verbal consent, signatures, and thumbprints (for those who did not know how to write) were sought from the respondents after a thorough explanation of the topic. The respondents were assured of their rights to consent.

Confidentiality
Before data was collected, the respondents were assured that the information obtained from them was to be kept private and ensure confidentiality, and would only be used for academic purposes and planning to promote better social lives of patients. Code numbers were used instead of the patients' names as an assurance that no one would know from whom the information was obtained.

Results
Socio-demographic data

Table 1: showing socio-demographic data

Variables	Categories	Frequency (n=40)	Percentage (%) L
Sex	Female	24	60.00
	Male	16	40.00
Age	05-15	12	30.00
	16-30	16	40.00
	31-50	9	22.50
	Above 50	3	07.50
Tribes	Muganda	10	25.00
	Munyankole	5	12.50
	Munyoro	1	2.50
	Musoga	21	52.50
	Others	3	7.50
Address	Rural	27	67.50
	Urban	13	32.50
Education level	Illiterate	05	12.50
	Primary Education	12	30.00
	Secondary Education	16	40.00

	Tertiary Education	07	17.50
Occupation	Civil servant	4	10.00
	Business personnel	06	15.00
	Peasants	12	30.00
	Student	13	32.50
	Others	05	12.50
Marital status	Single	18	45.00
	Married	9	22.50
	Widow/widower	3	7.50
	Others	10	25.00
Socio-economic status	Low-income	16	40.00
	Middle-income	14	35.00
	High-income	10	25.00

Table 1 showed that 24(60%) of the participants were females and 16(40%) were Males. The ages of participants were: 16-30 years 16(40%), followed by 5-15years 12(30%), then 31-50 9(22.5%) and lastly above 50years 3(7.5%). By tribe, 21 (52.5%) of the participants diagnosed with ocular hyperopia were Basoga, 10 (25%) were Baganda, 5(12.5%) were Banyankole, 3 (7.5%) were from other tribes of Uganda, and 1 (2.5%) was a Munyoro.

By education level, 16 (40%) of the participants with ocular hyperopia attained secondary education, 12 (30%) of the participants with ocular hyperopia attained primary education, 7 (17.5%) of the participants with hyperopia had reached the tertiary level of education. In comparison, 05 (12.5%) of the participants with ocular hyperopia were illiterate.

Of the 40 participants diagnosed with ocular hyperopia based on occupation, 13 (32.5%) were students, 12 (30%) were peasants, 6 (15%) were business personnel, 5 (12.5%) were affiliated to other professions, and 4 (10%) were civil servants.

When assessed according to Residence or address, 27 (67.5%) lived in rural (village) areas, while 13 (32.5%) lived in urban (town) areas.

When assessed according to their marriage status; 18(45%) of the participants were single, 10(25%) had other statuses, 9(22.5%) were married, and 3(7.5%) were widow/widowers

Lastly by socio-economic status, 16(40%) were low-income earners, 14(35%) were middle-income earners, and then 10(25%) were high-income earners.

Prevalence of ocular hyperopia with age (5-80 years)

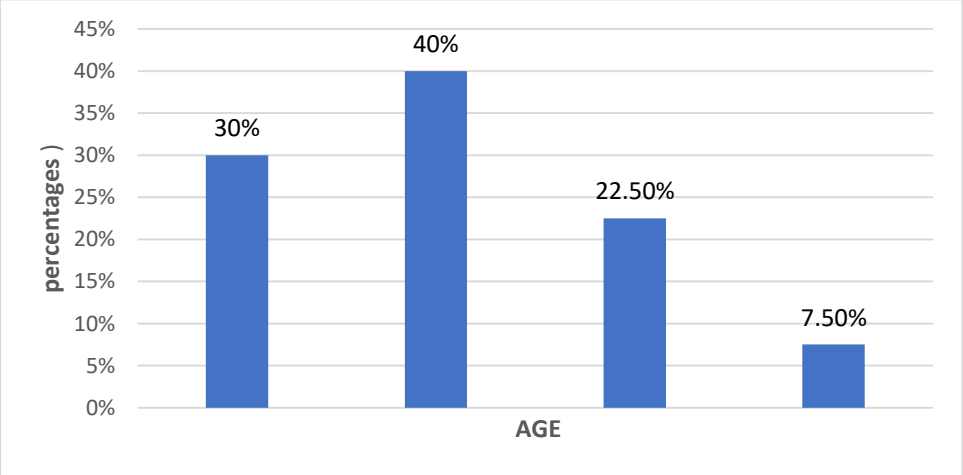

Figure 1: Showing Prevalence of ocular hyperopia with age

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Figure 1 shows that the ages of participants were: 16-30 years, 16(40%), followed by 5-15years, 12(30%), then 31-50 years, 9(22.5%), and lastly above 50years, 3(7.5%).

Prevalence of ocular hyperopia with tribes

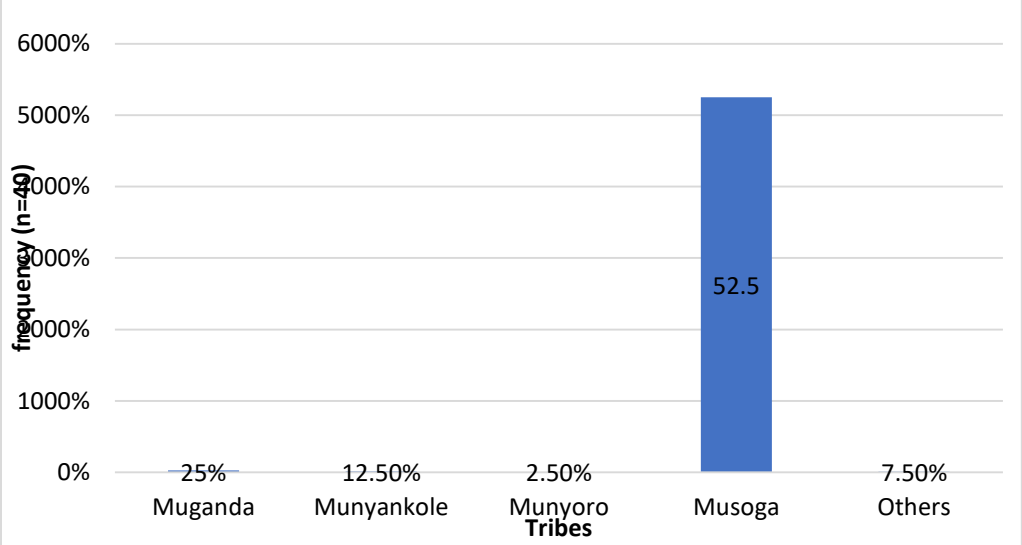

Figure 2: Showing the Prevalence of ocular hyperopia with the tribe

Figure 2 showed that, out of 40 participants diagnosed with ocular hyperopia, 21 (52.5%) were Basoga, 10 (25%) were Baganda, 5(12.5%) were Banyankole, 3 (7.5%) were from other tribes of Uganda, and 1 (2.5%) was a Munyoro.

Prevalence of ocular hyperopia with education level

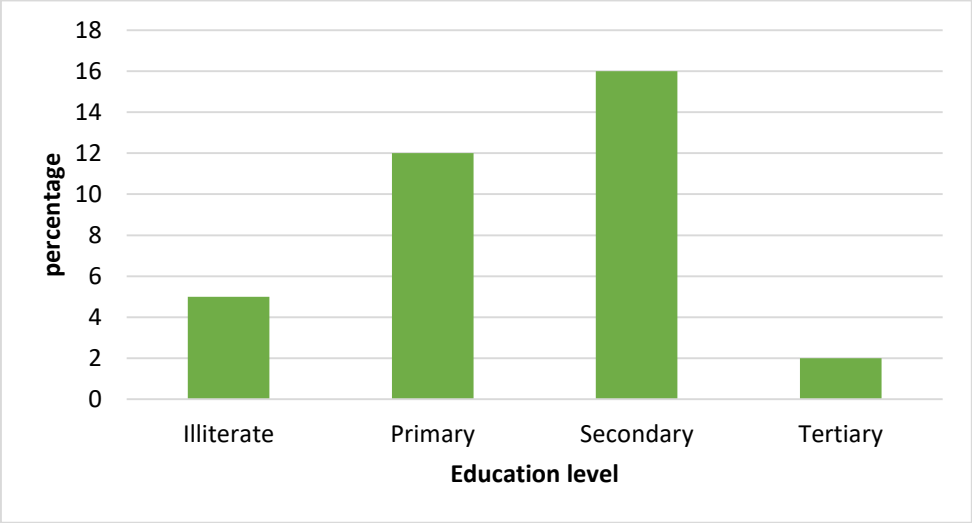

Figure 3: Showing the Prevalence of ocular hyperopia with education level

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Figure 3 showed that 16 (40%) of the participants with ocular hyperopia attained secondary education, 12 (30%) of the participants with ocular hyperopia attained primary education, 7 (17.5%) of the participants with hyperopia had reached the tertiary level of education, while 05 (12.5%) of the participants with ocular hyperopia were illiterate

Prevalence of ocular hyperopia with place of residence

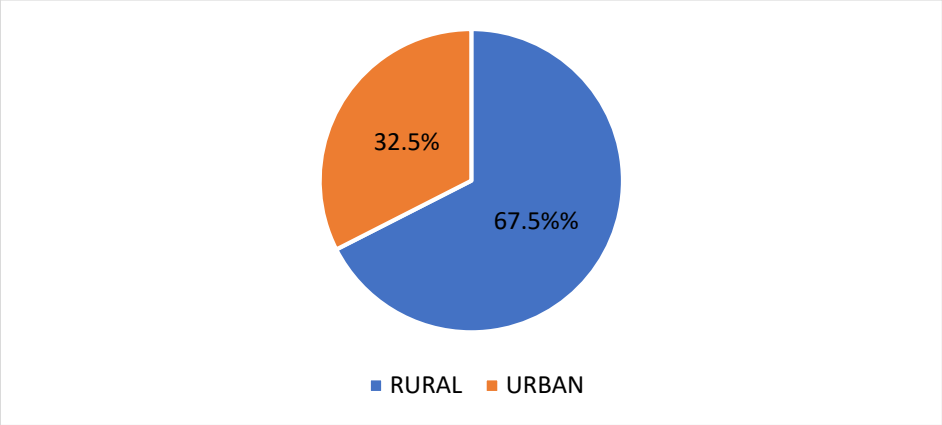

Figure 4: Showing the Prevalence of ocular hyperopia with place of residence.

Figure 4 shows that 27(67.5%) of the participants diagnosed with ocular hyperopia were staying in rural areas, and 13(32.5%) of the participants diagnosed with ocular hyperopia were staying in urban areas.

Risk factors associated with ocular hyperopia among patients receiving eye care services at Jinja Regional Referral Hospital.

Table 2: Showing Risk factors associated with ocular hyperopia

Variables	Category	Frequency	Percentage (%)
What type of family do you live in?	Large family	22	55.00%
	Small family	18	45.00%
Family history	Yes	26	65.00%
	No	14	35.000%
Have you ever been diagnosed with ocular hyperopia?	No	26	65.000%
	Yes	14	35.00%
Do you wear glasses?	Yes	21	52.50%
	No	19	47.5%
Do you have any other eye conditions?	Yes	15	37.50%
	No	25	62.50%
Do you experience blurred vision when looking at near objects?	Yes	15	37.50%
	No	25	62.50%
Difficult in reading or performing other tasks.	Yes	20	50.00%
	No	20	50.00%
Hours spent on reading or performing near tasks.	<2hours	8	20.00%
	2 – 4	10	25.00%
	4 – 6	10	25.00%

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	>6hours	12	30.00%
Do you engage in outdoor activities	Regularly	20	50.00%
	occasionally	12	30.00%
	Rarely	8	20.00%

Table 2 showed that 22(55%) of the participants were from large families, and 18(45%) were from small families. Of the participants, 26(65%) had a family history of hyperopia, and 14(35%) had no family history of ocular hyperopia. Those newly diagnosed with ocular hyperopia were 26(65%), and those who had ever been diagnosed were 14(35.00%). 21(52.5%) individuals were putting on glasses, and 19(47.5%) individuals were not putting on glasses. Those who experience blurring of vision while looking at near objects were 15(37.5%), and those who do not experience blurring of vision were 25(62.5%). Those with difficulty in reading or performing near tasks were 20(50%), and those without difficulty were 20(50%). Lastly, those who engage in outdoor activities regularly were 20(50%), occasionally were 12(30%), and those who rarely engage in outdoor activities were 8(20%).

Figure 5 shows the associated risk factors of ocular hyperopia with family size.

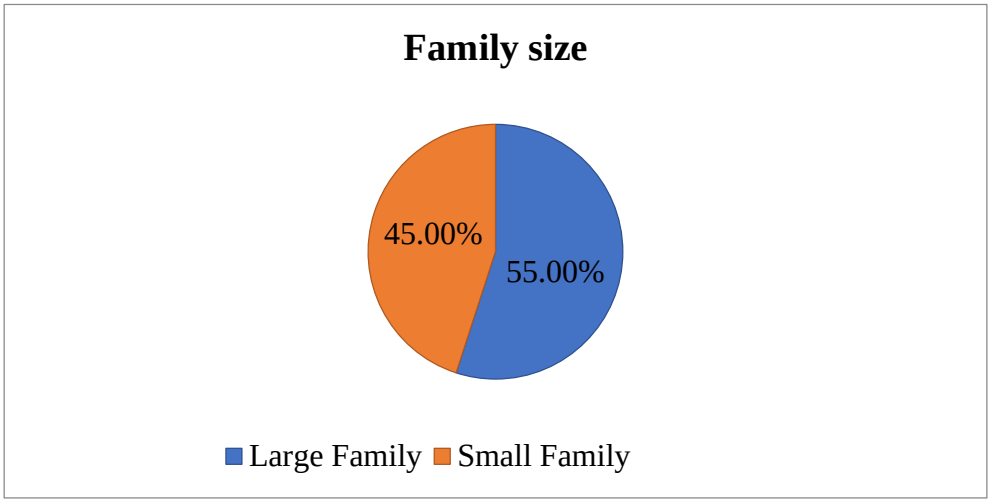

Figure 5: associated risk factors of ocular hyperopia with family size.

Figure 5 showed that 22(55%) of the participants diagnosed with ocular hyperopia were coming from large families, and 18(45%) of the participants diagnosed with ocular hyperopia were coming from small families.

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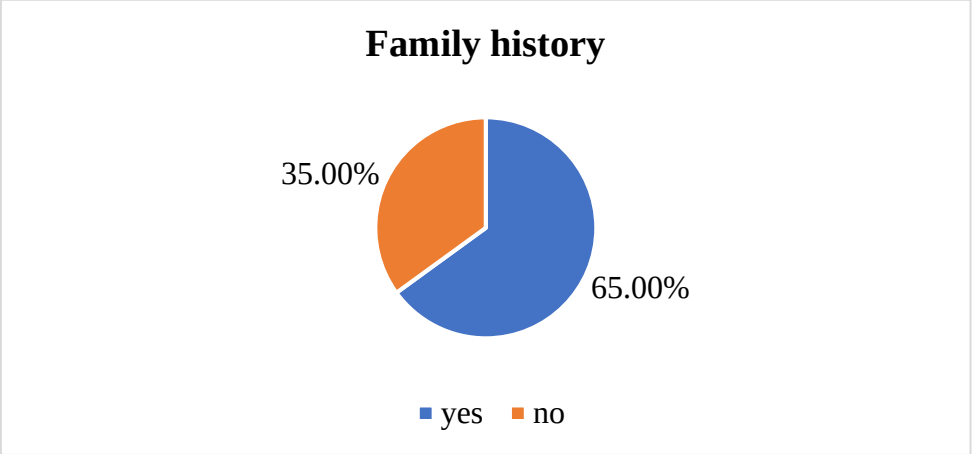

Figure 6: associated risk factors of ocular hyperopia with family history

Figure 6 showed that 26(65%) had family history of hyperopia and 14(35%) had no family history of ocular hyperopia

Those diagnosed with ocular hyperopia

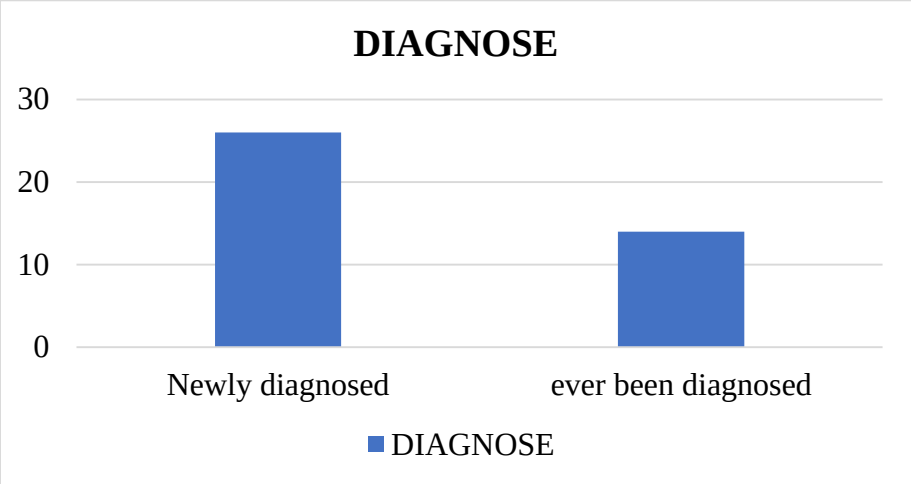

Figure 7: Showing risk factors of ocular hyperopia with diagnosis

Figure 7 showed that those newly diagnosed with ocular hyperopia were 26(65%), and those who had ever been diagnosed were 14(35.00%).

Management strategies for ocular hyperopia

Table 3: Management strategies of ocular hyperopia

Variable	Frequency (n=40)	Percentage (%)
Glass lenses	26	65%
Contact lenses	5	12.5%
Refractive surgery	3	7.5%

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Table 3 showed that 21 (52.50%) of the cases were managed with eyeglasses, 5 (12.50%) were managed with contact lenses, and 3(7.5%) were for refractive surgery.

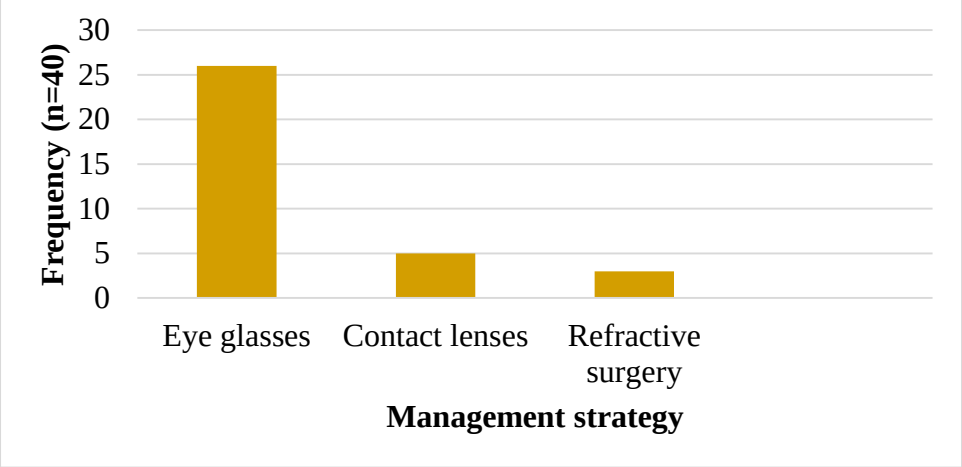

Figure 8: Showing Management strategies of ocular hyperopia

Figure 8 showed that 21 (52.50%) of the cases were managed with eyeglasses, 5 (12.50%) were managed with contact lenses, and 3(7.5%) were managed with refractive surgery.

Table 4: Satisfaction with the current treatment

Variable	Frequency (n=40)	Percentage (%)
Satisfied	20	50%
Not satisfied	9	22.5%
Very satisfied	5	12.5%

Table 4 showed that 50% of the participants were satisfied with the treatment, 22.5% were not satisfied, and 12.5% were very satisfied with the current treatment.

Discussion

Demographic factors of ocular hyperopia

The results show that hyperopia was most common among patients aged 16 – 30years 16(40%). This is probably because in latent hyperopia, the eyes' focusing abilities (accommodation) can often mask hyperopia. Over time, especially under stress or prolonged near work, this can manifest more clearly as symptoms of hyperopia, increased screening among young adults, particularly students or office workers, who often undergo eye examinations for near work-related strain. This could lead to a higher detection rate of hyperopia compared to other groups. These findings correspond with the study by Mejia-Salgado et al. (2024) in Colombia, which reported a high prevalence of ocular hyperopia in young age groups.

In the same study, the female gender 24(60%) was more affected than the Male 16(40%), this is likely due to female having shorter axial length, and generally have slightly small eyes, which may contribute to hyperopia, also hormonal changes, particularly during puberty or pregnancy, might influence refractive errors, women also seek eye care more frequently, leading to high detection rates. Mejia-Salgado et al. (2024), in their study on hyperopia, seem to agree that there is a stronger prevalence of hyperopia in females than in males.

The study also highlighted a higher prevalence in rural residents 27(67.5%), it is likely due to genetic predisposition where hyperopia has a genetic component, and certain rural populations may have higher genetic susceptibility due to limited gene flow or intermarriages within smaller communities, also limited access to eye care services in rural areas often due to lack of adequate healthcare infrastructure, including optometrists and ophthalmologists. This results in delayed detection and treatment of refractive errors like hyperopia. This study was consistent with the research from Kakamega County, Kenya, Okenwa-Vincent et al. (2022), which showed higher hyperopia rates among rural adolescents with limited access to eye care facilities.

Education level data further aligns with findings from other African studies, such as the study conducted in South Africa

(Denis Plotnikov, 2021), which found that hyperopia was more common among individuals with lower educational levels. These findings collectively suggest that socioeconomic and environmental factors in rural settings may contribute to the delayed detection and treatment of hyperopia.

Risk factors associated with ocular hyperopia

In this study, 26(65%) of the patients with hyperopia reported a family history of the condition. Hyperopia probably runs in families, supporting the genetic link suggested by Joseph et al. (2018), who found familial patterns to be significant in hyperopic individuals in southern India.

The high prevalence of familial history of hyperopia (65%) underscores the genetic influence in developing this refractive error, consistent with the findings by Joseph et al. (2018) that genetic predisposition significantly impacts hyperopia prevalence.

In the same study, 22(55%) were from large families compared to 18(45%) from small families. The high rates in large families were likely to be due to a genetic hereditary component. In large families, the likelihood of passing down genetic traits that predispose to hyperopia increases; also, large families share the same living environment, which might contribute to uniform exposure to factors affecting eye development. Okenwa-Vincent et al. (2022), in their study on hyperopia, seem to agree that there is a high prevalence of hyperopia in large families.

In contrast, factors like outdoor activities also emerged as influential, with 20(50%) of patients regularly engaging in outdoor activities, which can potentially mitigate near-work-related eye strain. However, these activities do not necessarily prevent hyperopia, as evidenced by high rates of the condition even among active individuals.

Additionally, only 37.5% of hyperopic patients had other eye conditions, such as cataracts, which is in line with the studies that associate with other age-related eye conditions, but to a lesser extent. This suggests that, while hyperopia can co-occur with other ocular conditions, it remains predominantly a standalone issue among younger populations at Jinja Regional Referral Hospital.

Management approaches for ocular hyperopia.

The study shows that 26(65%) of hyperopic patients use prescription eyeglasses, a trend seen globally, especially in resource-limited settings. The reliance on eyeglasses is consistent with the findings from Mobeen et al. (2017), who noted that eyeglasses are the most accessible and affordable refractive option in low-income regions.

The high use of eyeglasses (65%) reflects their affordability and accessibility, especially for rural populations, which is similar to the findings in South Africa, where eyeglasses were the primary correction method in low-resource areas.

Contact lenses were chosen by 12.5% of patients, with refractive surgery (such as LASIK) chosen by only 7.5%. The low adoption rate of surgery reflects socioeconomic barriers, as these options are often expensive and may not be readily available. In comparison, more developed regions, where refractive surgeries are more affordable, tend to have higher rates of surgical correction. The preferences for eyeglasses in Jinja highlight the need for increased accessibility to advanced options like surgery and contact lenses, especially for patients who might benefit from more permanent solutions.

Conclusion

This study indicates a high prevalence of hyperopia among patients at Jinja Regional Referral Hospital, with significant associations to demographic and genetic factors. The prevalence rate underscores the need for increased awareness and accessibility of eye care services in rural and underserved areas. Family history emerged as a key risk factor, suggesting a strong genetic component in hyperopia cases, while the reliance on eyeglasses highlights the limited availability of more advanced corrective options in the region.

These findings are consistent with global and regional research, emphasizing the role of socioeconomic status, education level, and rural residence in influencing hyperopia rates. Overall, the study illustrates the importance of targeted interventions and more robust eye care resources to manage hyperopia effectively with this community.

Recommendations

Improve screening and awareness.

Community screening and awareness: implement regular eye screening programs, especially in rural areas, to facilitate early detection of hyperopia among those with limited access to health care. Emphasizing screening among individuals with a family history of hyperopia could also help in early identification and management.

Public awareness campaigns: increase public awareness about ocular hyperopia, its symptoms, and the importance of regular eye checkups. Educational campaigns can target schools, workplaces, and community centers, with a focus on rural areas where awareness and access are limited.

Enhance access to corrective options.

Subsidized eye care services: offer subsidies for eyeglasses, especially for low-income patients, as they are the most common corrective option. Collaborating with non-profit or

government programs to provide affordable eyeglasses could significantly impact visual health outcomes.
Expand availability of Advanced Treatment: increase access to contact lenses and refractive surgeries (e.g., LASIK) by working with local hospitals and clinics to offer affordable options. Providing payment plans or financial assistance for surgical treatments could make these payments more attainable to patients.

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List of Abbreviations
BE	Both eyes
D	Diopter
EPP	Estimated pool prevalence
JRRH	Jinja Regional Referral Hospital
LE	Left Eye
OPD	Outpatient Department
RE	Right Eye
UAHEB	Uganda Allied Health Examination Board
VI	Visual Impairment
WHO	World Health Organization

Source of funding
The study received no funding or a grant.

Conflict of interest
The author declared no conflict.

Author contributions
Lamek Lubowa was the research investigator.
Norman Ndikuno supervised the research project.
Isaac Obol Okot supervised the research project.
Michael Kabasa supervised the research project.

Data availability
Data is available upon request.

Informed consent
All the study participants consented to the study

Author Biography
Lamek Lubowa holds a diploma in Clinical Ophthalmology from the Ophthalmic Clinical Officer's Training School, Jinja.
Norman Ndikuno is a tutor at the Ophthalmic Clinical Officer's Training School, Jinja.
Isaac Obol Okot is the Principal at the Ophthalmic Clinical Officer's Training School, Jinja
Michael Kabasa is the Chairman of the Research Committee at the Ophthalmic Clinical Officer's Training School, Jinja

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