Original Article

Pattern of Ametropia, Presbyopia, and Barriers to the Uptake of Spectacles in Adult Patients Attending a General Hospital in Kaduna State

Abstract

Aim: The aim of the study was to assess the pattern of ametropia, presbyopia, and the barriers to the uptake of spectacles among adult patients attending Hajiya Gambo Sawaba General Hospital (HGSGH), Zaria, Nigeria. **Materials and Methods:** This study was a descriptive hospital-based study. The study population was selected by systematic sampling over a 3-month period (July–September, 2016). A questionnaire was administered for sociodemographic data, patients' history, and refraction. Patients with visual acuity less than 6/12 or who required at least +1.00DS to read N8 were given spectacle prescriptions and assessed after 2 months to confirm if they purchased the spectacles. **Results:** Two hundred and nine patients were assessed: 124 (59.3%) females and 85 (40.7%) males. The age ranged from 18 to 75 years with a mean of 45.5. One hundred and seventy-five (83.7%) had ametropia, 100 (47.8%) had presbyopia, and patients having both were 66 (31.6%). Astigmatism was the most common ametropia, 118 (67.4%), followed by hypermetropic astigmatism 33 (18.9%) and myopia 24 (13.7%). Only 97 (46.6%) patients purchased their spectacles, and 92 of them were using their spectacles. One hundred and twelve (52.2%) patients did not buy their spectacles, with cost being most common barrier to the uptake of spectacles. **Conclusion:** There is a high burden of ametropia and presbyopia among patients attending HGSGH, Zaria. Cost of spectacles and 'no felt need' were found to affect spectacle uptake. Health information and availability of low-cost spectacles are important strategies in reducing the burden of uncorrected ametropia and presbyopia in Kaduna State.

Keywords: *Ametropia, barriers, presbyopia, spectacles*

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Introduction

Ametropia (refractive error) is an anomaly of the refractive state of the eye in which with relaxed accommodation, the image of objects at infinity is not formed on the retina.[1] The visual effect is a blurry image that leads to visual impairment. The different types of ametropia are hypermetropia, myopia, and astigmatism. Presbyopia is age-related physiological insufficiency of accommodation, which leads to progressive reduction in near vision.[2] However, when a clear image is formed on the retina, the condition is known as emmetropia.

Visual impairment is a functional limitation of the eye or eyes of the visual system. It could be defined as presenting visual acuity (VA) of less than 6/12 in the better eye.[3]

Corrective lenses are the simplest and most commonly used method to correct low-to-moderate refractive errors. This method is easy, non-invasive, and least expensive.[4] Spectacles are lenses in frames that are worn in front of the eyes. Spectacles may also be used as protection for the eyes or for cosmetic reasons.

However, spectacle uptake in rural settings is poor. Factors such as affordability, availability, fear of damage to the eyes, and the fragility of lenses[5] completely limit or modify their use. Other barriers are lack of felt need and lack of awareness.[6] Such barriers leave individuals with visual disability, more so in children, who may suffer amblyopia later in life. There has also been an abuse of spectacle dispensing due to lack of standardization, superfluous prescriptions, and distribution by individuals who have no professional experience in eye care or dispensing.[5]

In Nigeria, the National Blindness and Visual Impairment Survey study group found that 2.7 million people 40 years and above had moderate visual impairment and 400,000 had severe visual impairment. Uncorrected refractive errors were the commonest cause of mild and moderate visual impairment, accounting for 77.9% and 57.1%, respectively, in this survey. Refractive errors were responsible for 1.4%

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avoidable blindness in persons 40 years and above in Nigeria, at the time of the survey (2005–2007).[7] In other developing countries, such as Tanzania, prevalence of visual impairment due to uncorrected ametropia was found to be 10.4%[6] and in China 13.18%.[8] In developed countries such as Canada, visual impairment from refractive error was found to be 2.7%.[9]

Globally, 285 million people have visual impairment and uncorrected refractive error accounts for 42%, whereas cataracts account for 33%.[10] Globally, in 2005, it was estimated that 1.04 billion people have presbyopia.[11]

The global economic cost in lost productivity due to avoidable distance vision impairment alone was estimated to be US$202 billion each year.[12]

Refractive error was one of the priority diseases of Vision 2020: The Right to Sight, a global initiative to eliminate avoidable blindness by the year 2020.[13]

Uncorrected ametropia has a negative social and economic effect on the individual and the community. It can reduce the quality of life. It restricts education and employment opportunities for otherwise healthy individuals. It limits the productivity of individuals.[14] Adults with uncorrected ametropia may have difficulty completing tasks at work, which may lead to unnecessary delays and queries. Despite the adverse effects of not wearing their spectacles, patients have been observed to still not purchase their spectacles.[14]

Understanding the barriers will assist stakeholders in eye care in the state and the state Ministry of Health in formulating effective strategies to provide efficient and effective optical services to reduce the burden of patients with ametropia and presbyopia.

Materials and Methods

This was a descriptive cross-sectional study carried out at the eye clinic of Hajiya Gambo Sawaba General Hospital (HGSGH), Zaria, Kaduna State, North Central Nigeria. Approximately 1,000 new patients are seen monthly and more than 10,000 new patients are seen per annum in the eye clinic. Adult patients (>18 years) were recruited from July to September, 2016. A non-probability sampling method was used; all consecutive patients diagnosed as having refractive error who met the inclusion criteria were counselled, assigned a study number, and a written informed consent was obtained from them.

Included in the study were adult patients with ametropia (VA 6/12 or worse improving with pinhole and/or near vision that required at least +1.00DS to read N8 at 40 cm), with no other ocular pathologies, and who consented to participate. Those without refractive error, having other ocular pathologies, and refused to give consent were excluded.

Ethical clearance was obtained, the study was in compliance with the Declaration of Helsinki. All patients signed an informed consent form.

VA unaided and aided was assessed using a Snellen/E-chart at 6 m. Near vision was also assessed using the Roman test type. Patients with a VA of 6/12 or worse and/or near vision greater than N8 were recruited and had autorefraction done using a POTEC PRK-7000 autorefractor. An average of three readings was used for accuracy. Each of the participants then underwent a subjective refraction.

All patients with VA ≤ 6/12 in either eye, or whose vision could be improved by two or more lines on the Snellen chart in either eye, and/or near vision needing at least +1.00DS to read N8, were given a prescription to purchase corrective spectacles in the hospital or elsewhere.

Follow-up of 2 months after prescription of corrective lenses was given to the patients, to find out if the patients purchased their spectacles and were using them. Patients not using their corrective spectacles were asked 'why are you not using your spectacles'? Reasons for not using the correction was also determined. Follow-up was done in person or by phone call.

The data obtained were analysed using the Statistical Package for Social Sciences (SPSS) (version 23.0, SPSS Inc., Chicago, IL, USA). Frequencies, proportions, and tables were used to summarize data, and bivariate analysis was conducted to identify factors associated with ametropia, presbyopia, and uptake of spectacles. Odds ratio with 95% confidence intervals was used to determine any statistically significant associations. A *P*-value of less than 0.05 was considered significant.

Results

Two hundred and nine patients were assessed: 124 (59.3%) were females and 85 (40.7%) males. The age ranged from 18 to 75 years with a mean of 45.5. One hundred and seventy-five (83.5%) patients had ametropia, 100 (47.8%) had presbyopia, and patients having both were 66 (31.6%). Astigmatism was the most common ametropia, 118 (67.4%), followed by hypermetropic astigmatism 33 (18.9%) and myopia 24 (13.7%) [Figure 1].

Ametropia and presbyopia were more common in females, 65.1% and 52.9%, respectively. Ametropia was more common among the <21 years age group, whereas presbyopia presented more among the 41–50 years age group [Table 1].

Only 97 (46.6%) purchased (uptake) their spectacles and 92 of them were using their spectacles. About 112 (52.2%) patients did not buy their spectacles. Age groups <21 and 41–50 years had the highest percentage of patients (20.6% each) who purchased their spectacles, and more males (51.5%) purchased their spectacles than females (48.5%). Uptake of spectacles was highest (54.6%) among patients with tertiary education and least (3.2%) among those with no formal education [Table 2].

Having formal education and being a civil servant were associated with purchasing of spectacles with *P*-values of ≤0.001 and 0.002, respectively [Table 3]. The majority (94.8%) of those who purchased spectacles used them [Table 4]. The

main reason given for not using the spectacles by those who did not were 'Don't need it' and 'fear of damaging the eyes'.

The main barrier to the uptake of spectacles among the patients who did not purchase was 'not affordable' [85 (75.8%)] [Table 5].

Discussion

This study showed that uncorrected ametropia is a significant cause of visual impairment in patients attending the eye clinic in the study centre. Spectacle prescription corrected all of the ametropia which is comparable to findings elsewhere; that refractive error is one of the most effectively treatable causes of visual impairment.[15]

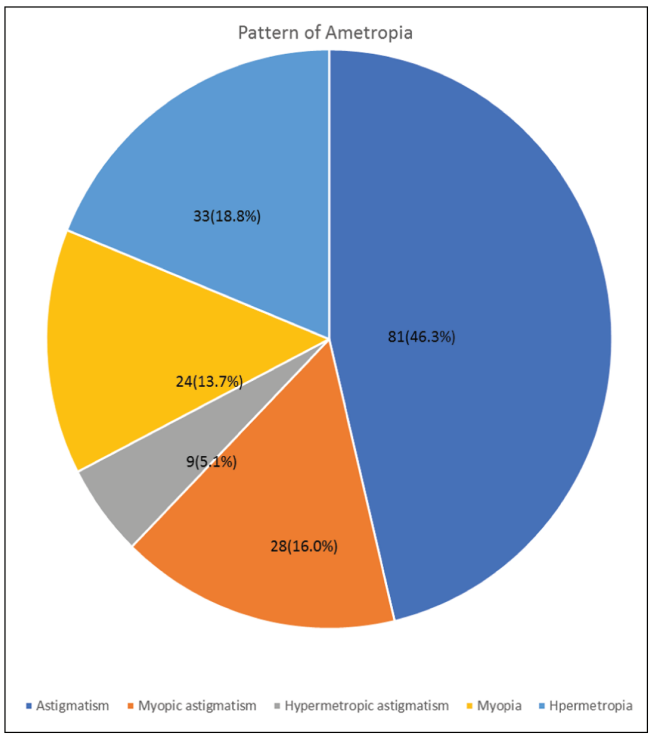

Figure 1: Pattern of ametropia

In this study, astigmatism (including hypermetropic and myopic astigmatism) was found to be the most common ametropia (67.4%). This is in agreement with the findings of Lawan *et al.*[16] in a hospital setting in Kano and of Abah *et al.*[17] in a university population in Zaria. The finding of more astigmatism in this study is in contrast to other hospital-based studies in Nigeria. Bagaiya and Pam[18] found hyperopia to be the most common refractive error (21.7%), whereas Malu and Ojabo,[19] Adeoti

Table 2: Purchasing of spectacles by sociodemographic characteristics of sampled patients attending Hajiya Gambo Sawaba General Hospital, Zaria

Sociodemographic variable	Frequency	%
Age (years)		
< 21	20	20.6
21–30	18	18.6
31–40	15	15.5
41–50	20	20.6
51–60	15	15.5
>60	9	9.3
Total	97	100
Gender		
Female	47	48.5
Male	50	51.5
Total	97	100
Education		
Tertiary	53	54.6
Secondary	24	24.7
Primary education	17	17.5
No formal education	3	3.2
Total	97	100
Occupation		
Civil service	24	24.7
Students	38	39.2
Trader/businessmen	16	16.5
Housewives	8	8.3
Retirees	4	4.1
Artisans	4	4.1
Farmers	3	3.1
Total	97	100

Table 1: Ametropia and presbyopia by age and gender among sampled patients attending Hajiya Gambo Sawaba General Hospital, Zaria

Sociodemographic variables	Ametropia, *n* (%)	Presbyopia, *n* (%)	Both, *n* (%)
Age (years)			
<21	32 (29.4)	0 (0.0)	0 (0.0)
21–30	28 (25.7)	0 (0.0)	0 (0.0)
31–40	23 (21.1)	8 (23.5)	14 (21.2)
41–50	7 (6.4)	21 (58.8)	22 (33.3)
51–60	11 (10.1)	6 (17.7)	18 (27.3)
>60	8 (7.3)	0 (0.0)	12 (60)
Total	109 (100)	34 (100)	66 (100)
Gender			
Female	71 (65.1)	18 (52.9)	35 (53.0)
Male	38 (34.9)	16 (47.1)	31 (47.0)
Total	109 (100)	34 (100)	66 (100)

Table 3: Factors associated with purchasing of spectacles among sampled patients attending Hajiya Gambo Sawaba General Hospital, Zaria (*n* = 209)

Variable	Buy spectacle (yes) *n* (%)	Buy spectacle (no) *n* (%)	Odds ratio (95% CI)	*P*- value
> Primary education	77 (59.2)	53 (40.8)	4.29 (2.31–7.94)	≤0.001
Being a civil servant	24 (72.7)	9 (27.3)	3.76 (1.65–8.57)	0.002
Male gender	50 (58.8)	35 (41.2)	1.51 (1.13–2.01)	0.003
Female gender	47 (37.9)	77 (62.1)	0.66 (0.50–0.89)	0.003
<40 years of age	50 (52.6)	45 (47.4)	1.58 (0.91–2.74)	0.132

CI: confidence interval

Table 4: Use of spectacles by sociodemographic characteristics of sampled patients attending Hajiya Gambo Sawaba General Hospital, Zaria

Sociodemographic variable	Frequency	%
Age (years)		
< 21	20	21.7
21–30	17	18.5
31–40	14	15.2
41–50	19	20.7
51–60	14	15.2
>60	8	8.7
Total	92	100
Gender		
Female	46	50
Male	46	50
Total	92	100
Education		
Tertiary education	48	52.2
Secondary education	24	26.1
Primary education	17	18.5
No formal education	3	3.2
Total	92	100
Occupation		
Civil servant	22	24
Students	37	40.2
Trader/businessmen	15	16.3
Housewives	8	8.7
Retirees	4	4.4
Artisans	4	4.4
Farmers	2	2.1
Total	92	100

and Egbewale,[20] Adefule-Ositelu,[21] and Koroye-Egbe *et al.*[22] all found myopia to be the most common error.

African population-based studies such as Medi *et al.*[23] in Kampala and Otutu[24] in South Africa found astigmatism to be the most common with prevalences of 11.6% and 30.8%, respectively. In non-African studies, Pan *et al.*[25] in the USA also found astigmatism to be the most common (45.0%) in a multiethnic study, whereas studies in India[26] and China[27] found myopia to be most common. The relative differences have been attributed to longer axial length in Asians, nutritional and environmental factors.[28,29]

This study found early presentation of presbyopia from the age group 31 to 40 as in Africans due to earlier ageing of the crystalline lens, whereas the presentation in Caucasians is much later.[20] An increase in the number of presbyopic patients with increasing age was noted. However, a decline was observed in the 51–60 age group.

This decline in number may be due to the fact that this is a hospital-based study, with more of the elderly ones staying at home rather than coming to the hospital. Predominantly, non-literate farming population may not acquire spectacles since they may not see the need for it.

The prevalence of presbyopia in this study compares with the findings of Abah *et al.*[17] in a university population, but slightly lower than the 56% reported by Bagaiya and Pam[18] and 52.9% by Malu and Ojabo,[19] but higher than 31.8% reported for South Western Nigeria and 12.8% in Yenagoa, Bayelsa State, Nigeria. These differences may be due to environmental factors or genetic predisposition.

Previous hospital studies[17,18,20] and population-based studies[6,23-27,30-35] in Nigeria and elsewhere in Africa and Asia also found presentation earlier than 40 years. This pattern has been documented in descriptions of presbyopia in tropical regions. Interestingly, a study[23] in Bayelsa detected presbyopia in even younger people of 30–34 years.

The majority of presbyopic patients are in the working age group. In this study, civil servants constituted the majority of presbyopic patients followed by housewives, probably due to the fact that the two categories need clear vision to carry out their day-to-day activities.

The patients who purchased their spectacles had formal education and were mostly civil servants (24.7%) and students (39.2%), probably due to the fact that civil servants need good vision to carry out their work and students need good vision for their studies. Few housewives (8.3%) purchased their spectacles. The housewives were generally unemployed and lack empowerment, and though they need the spectacles, they may not be able to purchase them on their own without financial support from their husbands.

The uptake of spectacles in this study was 46.4% and is in agreement with findings documented in population-based studies in India[36] (35.1%), India[37] (44.1%), Greece,[38] in the USA,[39] and in the UK.[40] However, it differs with studies in Nigeria[41-44] in which uptake was 12.1% in Calabar among medical students, 3.4% in Anambra, 17.6% in Enugu, and

Table 5: Barriers associated with purchasing spectacles by sociodemographic characteristics of sampled patients attending Hajiya Gambo Sawaba General Hospital, Zaria

Variable	Not affordable *n* (%)	Don't feel I need it *n* (%)	Not available in the hospital *n* (%)
Age (years)			
< 21	1 (1.2)	11 (47.8)	0 (0.0)
21–30	10 (11.8)	1 (4.4)	0 (0.0)
31–40	23 (27.0)	6 (26.1)	0 (0.0)
41–50	27 (31.8)	2 (8.7)	0 (0.0)
51–60	16 (18.8)	3 (13.0)	0 (0.0)
>60	8 (9.4)	0 (0.0)	4 (100)
Total	85 (100)	23 (100)	4 (100)
Gender			
Female	61 (71.8)	16 (69.6)	0 (0.0)
Male	24 (28.2)	7 (30.4)	4 (100)
Total	85 (100)	23 (100)	4 (100)

0.7% in Zamfara. However, this marked difference with other Nigerian studies is probably due to the fact that this was a hospital-based study and people who present in the eye clinics are patients with ocular problems which may include difficulty with vision and are prepared to purchase any hospital prescriptions. Although the study area is a semi-urban area, people from surrounding villages also present to the eye clinic but may not purchase spectacles due to economic reasons: cost of the spectacles and cost of transportation to the hospital.

Cost was the reason stated by almost all the patients. Other reasons were 'don't feel I need it' and 'not available at the hospital'. Since the majority of ametropic patients were astigmatic, their glasses were therefore special-order spectacles, which had to be surfaced outside the hospital at a high cost since the hospital does not have a surfacing machine.

The barriers to the uptake of spectacles in this study is comparable with findings from studies in other parts of Nigeria. Ayanniyi *et al.*[5] in a multi-hospital study found that wearers' challenges were that the 'spectacles were expensive', and they also had 'fear of damaging the eyes'. Other studies[8,45-47] also reported 'lack of felt need' and cosmetic reasons as barriers to uptake. In a multi-national African study,[36] it was found that barriers to spectacle uptake were economic reasons, lack of felt need, lack of access, personal reasons, and lack of awareness. Also, in studies in India[8] and China,[47] it was found that affordability was the most important barrier to spectacle uptake.

Conclusion

Both uncorrected ametropia and uncorrected presbyopia are significant causes of visual impairment in HGSGH, Zaria, Kaduna State, Nigeria. Both have impact on visually related tasks in the work place with economic importance. Spectacle correction for both ametropia and presbyopia is effective in our society.

There is relatively poor uptake of spectacles. Availability of refractive services and good quality spectacles at low cost are important strategies in increasing uptake and thereby reducing the burden of uncorrected ametropia and presbyopia in Kaduna State. Health education is also very important, patients should be informed that glasses do not damage the eyes but rather assist the eyes in its function of providing vision to the individual.

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Conflicts of interest

There are no conflicts of interest.

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