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Factors associated with patient preference of optical low vision devices in North West Nigeria.

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Abstract

Purpose: The study was conducted to identify factors associated with patients' preferences with optical low vision devices in North West Nigeria.

Methods: A mixed method study approach was adopted for this study. The study sample consisted of 219 patients seen over a 5-year period (2010-2015) who received optical low vision devices at the Low Vision Clinic of Health and Development Support Programme (HANDS), Jigawa State, Nigeria. In-depth interviews with 9 Low vision optometrists practicing in North Western Nigeria were also conducted. Data were summarized and presented in tables and figures. Chi square test statistics was used to test for association between categorical variables @ 95% confidence interval.

Results: The mean age of the 219 records of low vision patients reviewed was 45.28 $\pm$ 20.22 and 162 (74%) were males. Age and occupation had statistically significant association with use of magnifiers (χ^2=15.201, P=0.004 and χ^2=29.261, P=0.001, respectively). Patients between 30 and 59 years preferred spectacle magnifiers while younger patients (<30 years) preferred stand magnifiers. A statistically significant association was found between the younger age group (χ^2=12.127, P=0.002), students (χ^2=13.517, P= 0.004) and telescope use. Results from the key informant interview showed that age, cosmetic appeal and ease of use were considered major factors to patient preference of optical low vision devices.

Conclusion: Age and occupation were the only demographic factors significantly associated with patient preference with optical low vision devices. Information from this study would be of benefit to low vision practitioners in the stocking and cost effective management of low vision patients.

Keywords: Low vision devices, Low vision device preference, low vision device uptake, spectacle magnifier, Telescope, Stand magnifier.

Introduction

Low vision can be defined functionally as an irreversible loss of vision that impedes an individual's ability to learn or perform some or all of their usual and age-appropriate tasks but still allows some functional use of vision for daily activities[1]. According to World Health Organisation (WHO), "A person with low vision is one who has impairment of visual functioning even after treatment and/or standard refractive correction, and has a visual acuity of less than 6/18 to light perception in the better eye or a visual field less than 10 degrees from the point of fixation, but who uses, or is potentially able to use, vision for the planning and/or execution of a task for which vision is essential"[2].

Low Vision is one of the major causes of morbidity and has profound effects on the quality of life of individuals. They inhibit mobility and economic well-being of individuals affected as well as their families. Majority of those with low vision are older people, but whilst the prevalence in children is small, the burden in life years with low vision is significant[3].

Low vision can occur at any stage in life; however, it has higher prevalence in the elderly[4]. Most people develop low vision because of eye diseases[4]. The major eye conditions or diseases that cause low vision are Age-Related Macular Degeneration (AMD/ARMD), Diabetic Retinopathy, Glaucoma, Un-operated cataracts, Retinitis Pigmentosa[5]. Others include Retinopathy of Prematurity (ROP), Corneal Damage (due to Neonatal Conujnctivitis, Measles, Xerophthalmia, Trachoma and Trauma); Albinism, Optic Atrophy and Amblyopia[6].

It is estimated that 253 million people are visually impaired worldwide with 36 million people blind and 217 million have low vision[7]. In Nigeria, The National Blindness survey estimated that 3 million adults above the age of 40 years have moderate to severe low vision[8]. It also found that the North West geo-political zone (GPZ) has the largest number of blind and low vision adults, being the zone with the largest population with a prevalence of 9.75%[8].

Low vision is a public health problem. The improvement of the visual status of the low vision population depends largely on low vision rehabilitation. One of the key factors for effective rehabilitation is the use of optical low vision devices. Studies have shown that some of the major barriers to the provision of low vision services by eye care practitioners have been the lack of knowledge in appropriately prescribing low vision devices as well as high cost of low vision devices available on the market[9,10,11]. Failure in prescribing appropriate

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low-vision devices by low vision practitioners would prevent many individuals with low vision from access to these devices and thus prevent social integration and optimal quality of life. These increases cost to these individuals and deprive the society of the social and economic contributions of these individuals[12].

Studies conducted in Asia[13,14,15,16,] Middle East[17,18,] Europe[19,20,] North America[21] and South America[22] which show the preference pattern of optical low vision devices accepted by patients, differ in most of the studies from those seen in Nigeria[3,23,24] and Africa[25]. So far, the researchers found no published studies exclusively on the factors responsible for preference pattern of optical low vision devices by low vision patients in North Western Nigeria. This study, therefore, identifies the factors that may be responsible for low vision patients' preference of optical low vision devices, and determines if there is any relationship between demographic variables and type of optical low vision device preferred.

Methods

Study setting: The study was carried out in the Jigawa State, Nigeria. The state covers a total land area of about 22,410 square kilometers and is situated precisely in the North-western part of Nigeria. The study location was the Low Vision Clinic of Health and Development Support Programme (HANDS), in partnership with Jigawa State Ministry of Health.

Study design: A mixed methods study approach which involved cross- sectional retrospective review of patients' records and qualitative in-depth interview components was adopted to obtain information from the low vision practitioners.

Sampling procedure: All new patients, male and female patients, age 6 years and above that attended the low vision clinic of HANDS in Jigawa State between January 2010 and December 2015 were selected for the study. Purposive and snowballing sampling methods were used to determine the key informants, who were Low Vision service providers in North West Nigeria. These methods were used because the numbers of practicing low vision optometrists in this region were few and not known to many except those also practicing in the same region.

Sample size: Out of a total of 319 new patients who attended the low vision clinic of HANDS over a 5year period (2010 - 2015), clinical records of 219 patients who received optical low vision devices

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were reviewed and analyzed. A total number of Nine (9) Key informants (the Low Vision Optometrists practicing in the North West) were identified and contacted.

Inclusion Criteria: Male and female new patients, age 6 years and above, who attended the low vision clinics of HANDS between January 2010 and December 2015 and diagnosed with low vision, according to the WHO criteria, after assessment by qualified and licensed ophthalmologists and optometrists, were included in the study.
Low vision optometrists who had certified training in low vision rehabilitation (2 weeks or more training) and actively attending to low vision patients in their practice were enrolled in the study.

Exclusion Criteria: Those who did not meet the inclusion criteria and those who did not give consent were excluded from the study.

Data collection and analysis: The data collected in this study were in 2 forms. The first was secondary data through retrospective review of patient's records. The data collection tool was the data spread sheet which contained patients' age, gender, occupation, etiology of low vision, presenting and best visual acuities as well as type and power rating of optical low vision devices accepted. Statistical Package for Social Sciences (SPSS) software version 24 was used in the analysis of quantitative data. The data were presented in tables and charts. Descriptive presentation was made using frequency and percentages. Kolmogorov-Smirnov Test was used to determine the type of distribution of data. For the purpose of comparative analysis, the secondary data collected was segregated into gender, 3 age groups, 5 major groups for diseases causing low vision, 6 groups for occupation, presenting and best corrected visual acuity, type and power of optical low vision device preferred by patient. Chi-square test was used to test for association between variables. P-value <0.05 was considered to be statistically significant @ 5% alpha level.

The second data collected was from the 9 key informants (low vision optometrists) through telephone interview. The semi structured interview guide and consent form was emailed to the respondents prior to the interview. Informed verbal consent was obtained from the respondents before the interview commenced. Data collected were inductively coded and categorized into broad themes to highlight the perception of the key informants on the preference pattern of optical low vision devices by low vision patients in the North West region. Coded data and themes that evolved were categorized for further analysis using content analysis. The results of the findings were presented in a tabular form.

Ethical approval: Ethical clearance was obtained from the Jigawa State Ministry of Health (Ref. No. MOH/Sec. 3/S/723/I). Written approval was obtained from the HANDS for secondary data collection. Verbal informed consents were obtained from every key informant that participated in the study before the interview.

Results

Out of the 319 valid new patients' folders reviewed, analysis was made on 219 of them that were prescribed optical low vision device. Patients' gender distribution showed that more males 162 (74%) with low vision were seen in the clinic than females 57 (26%). Majority of the patients were

within the age group of 30 and 60 years at 94(43%) with the mean age of 45.28 ± 20.22 years (95% CI = 45.14 - 47.98) (Table 1). The occupational distribution showed that the majority of the patients were skilled workers at 78 (36%) followed by students 54 (25%) (Figure 1). The major disease groups causing low vision were Retina diseases 103(47%) (which comprised all posterior segment related diseases except Glaucoma) and Glaucoma 83 (38%) (Figure 2).

Out of those who had received magnifiers 128 (62%) had powers within the range of 4D to 12D (Figure 3). Spectacle magnifiers were the most prescribed magnifier 63 (49%). Out of those who had accepted optical low vision devices, 58 (26.5%) telescopes were prescribed, with 57 (98%) being monocular handheld. Figure 4 showed that the 6x telescopes were the most commonly prescribed magnification at 29 (50%).

In Table 2, the Chi square analysis to determine a relationship between magnifiers and patient demographics showed that age and occupation were statistically significantly associated (P<0.05) with magnifiers (χ^2 = 15.201, P=0.004); (χ^2 = 29.261, P=0.001) with older age groups 30 years and above as well as the unskilled and skilled workers preferring the use of magnifiers compared to the younger age group and other professions. In Table 3, the Chi square analysis to determine a relationship between telescopes and patient demographics showed that age and occupation were statistically significantly associated (p<0.05) with telescopes (χ^2 = 12.127, P=0.002), (χ^2 = 13.517, P=0.004), with the younger age group <30 years and students preferring the telescopes compared to other age groups and profession.

In Table 4, two broad themes, namely, most preferred optical low vision devices and perceived predictors to preference of optical LVDs, emerged out of qualitative analysis. The analysis showed that spectacle magnifiers which were mentioned by 4 out of the 9 key informants were considered the most preferred optical low vision devices by patients. Factors such as age, occupation, cosmesis of device, ease of use and general well-being were perceived as strong predictors to preference of optical LVDs.

Table 1: Gender distribution of low vision patients at the HANDS Low Vision clinic, Jigawa State (2010- 2015)

	Sex		
Age (Years)	**Female** n (%)	**Male** n (%)	**Total**
<30	20(35.1)	39(24.1)	59(27.0)
30 - <60	23(40.4)	71(43.8)	94(42.9)
60+	14(24.6)	52(32.1)	66(30.1)
Total	57(26.0)	162(74.0)	219(100.0)
Range	6 – 85 years	7 – 90 years	6 - 90 years
Mean±S.D	39.79±19.82	47.22±20.07	45.28±20.22
95% C.I	34.53 – 45.05	44.10 – 50.33	45.14 – 47.98

Occupation			
Unskilled worker	12(21.0)	38(23.4)	50(22.8)
Skilled worker	23(40.4)	55(34.0)	78(35.6)
Others	0(0.0)	5(3.1)	5(2.3)
Retired	5(8.8)	27(16.7)	32(14.6)
Student	17(29.8)	37(22.8)	54(24.7)
Total	**57(26.0)**	**162(74.0)**	**219(100.0)**

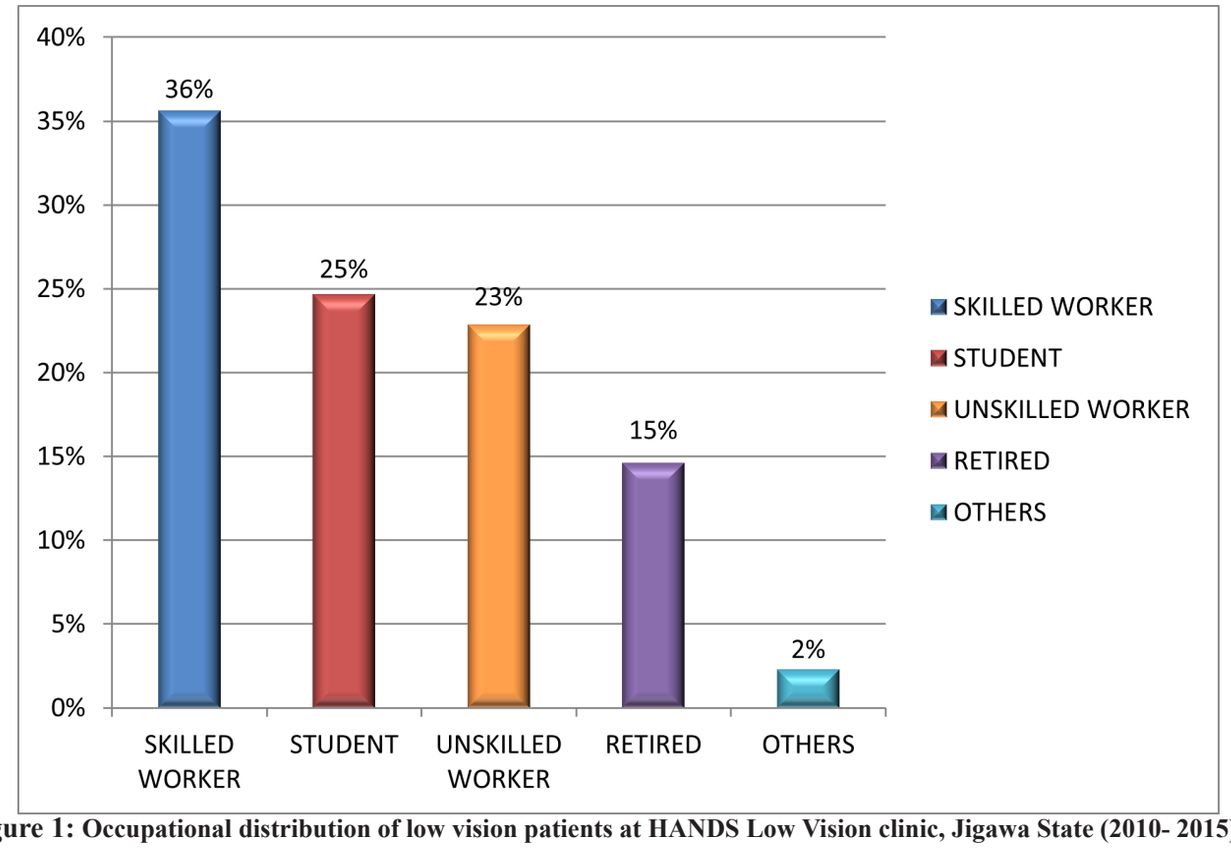

Figure 1: Occupational distribution of low vision patients at HANDS Low Vision clinic, Jigawa State (2010- 2015)

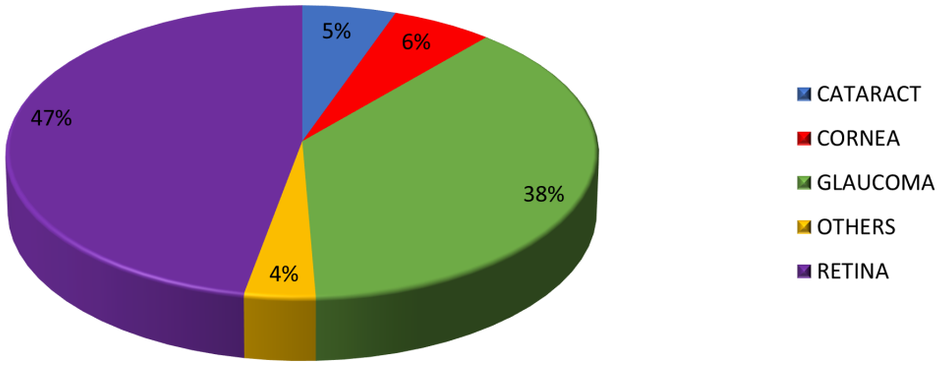

Figure 2: Causes of Low Vision seen at HANDS Low Vision clinic, Jigawa State

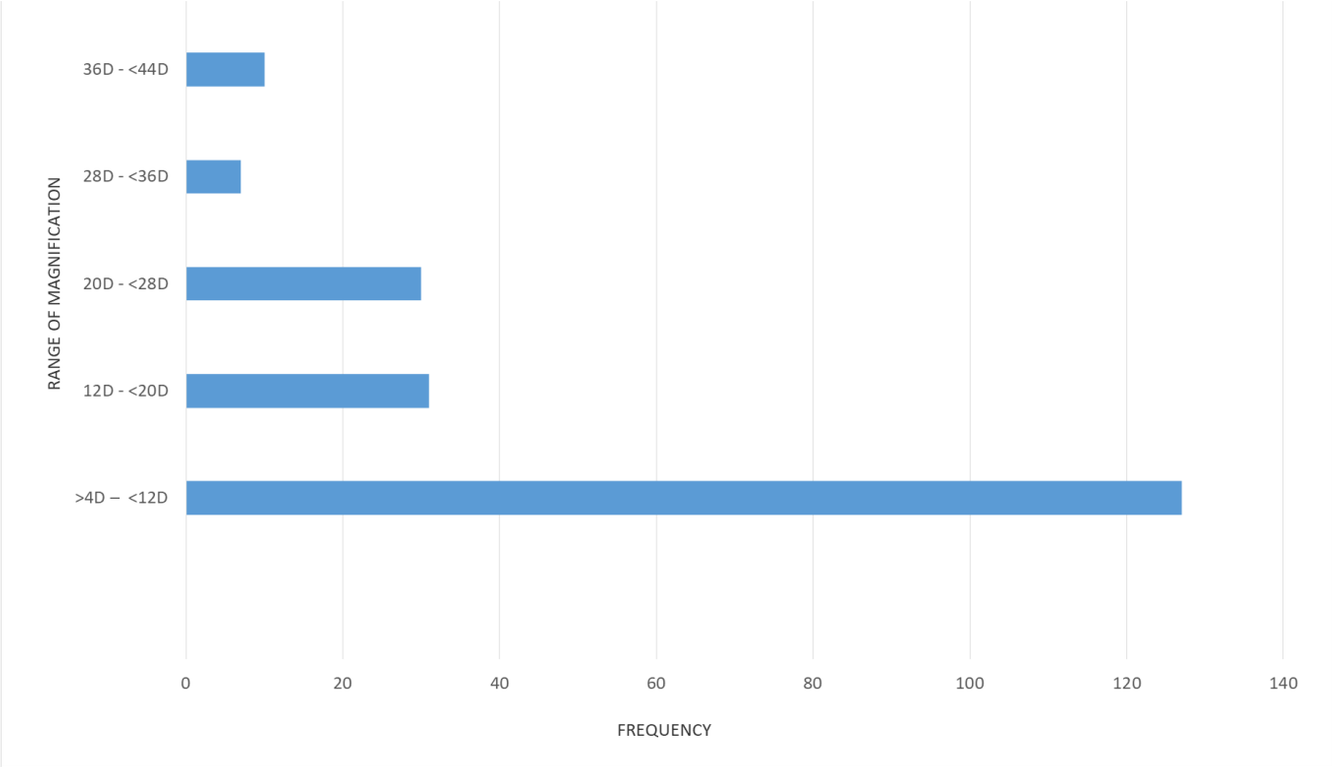

Figure 3: Range of dioptric power for magnifiers prescribed at HANDS Low Vision clinic, Jigawa State (2010- 2015)

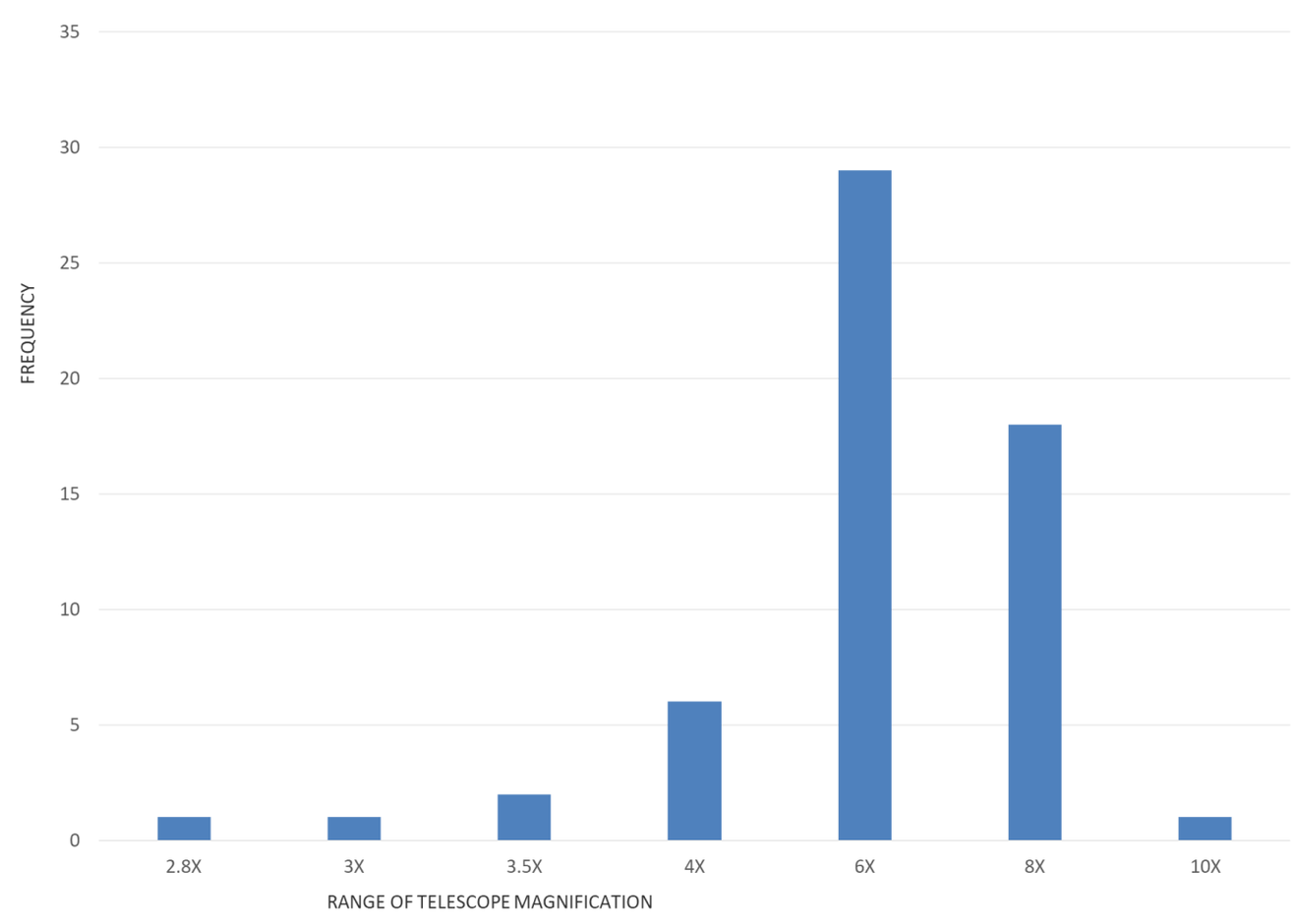

Figure 4: Range of magnification for telescopes prescribed at HANDS Low Vision clinic, Jigawa State (2010-2015)

Table 2: Demographic distribution of magnifiers prescribed at HANDS Low Vision clinic, Jigawa State (2010- 2015)

	Handheld Magnifier	Spectacle Magnifier	Stand Magnifier	χ^2	p-value
Sex	n(%)	n(%)	n(%)		
Male	22(14.3)	67(43.5)	65(42.2)	4.570	0.102
Female	3(5.9)	30(58.8)	18(35.3)		
Age group (Years)					
<30	4(8.2)	15(30.6)	30(61.2)	15.201	0.004*
30 - <60	16(17.8)	45(50.0)	29(32.2)		
60+	5(7.6)	37(56.1)	24(36.4)		
Occupation					
Unskilled worker	6(12.2)	29(60.0)	13(27.8)	29.261	0.001*
Skilled worker	12(15.8)	38(50.0)	26(34.2)		
Others	3(60.0)	1(20.0)	1(20.0)		
Retired	1(3.1)	16(50.0)	15(46.9)		
Student	3(6.8)	13(29.5)	28(63.6)		
Disease					
Cataract	2(18.2)	1(9.1)	8(72.7)	8.247	0.410
Cornea	1(11.1)	4(44.4)	4(44.4)		
Glaucoma	11(13.3)	42(50.6)	30(36.1)		
Others	0(0.0)	3(50.0)	3(50.0)		
Retina	11(11.5)	47(49.0)	38(39.6)		

*** Statistically Significant at 5% alpha level**

Table 3: Demographic distribution of telescopes prescribed at HANDS Low Vision clinic, Jigawa State (2010- 2015)

	Binocular Telescope	Monocular Telescope	χ^2	p-value
Sex	**n(%)**	**n(%)**		
Male	3(7.5)	37(92.5)	1.424	0.233
Female	0(0.0)	18(100.0)		
Age group (Years)				
<30	0(0.0)	43(100.0)	12.127	0.002*
30 - <60	3(25.0)	9(75.0)		
60+	0(0.0)	3(100.0)		
Occupation				
Unskilled worker	0(0.0)	5(100.0)	13.517	0.004*
Skilled Worker	3(27.3)	8(72.7)		
Retired	0(0.0)	1(100.0)		
Student	0(0.0)	41(100.0)		
Disease				
Cataract	0(0.0)	5(100.0)	1.312	0.859
Cornea	0(0.0)	6(100.0)		
Glaucoma	0(0.0)	3(100.0)		
Others	0(0.0)	3(100.0)		
Retina	3(7.3)	38(92.7)		

*** Statistically Significant at 5% alpha level**

Table 4: Excerpts from results of Key Informant Interview

S/No.	BROAD THEMES		
A.	**Optical low vision device most preferred by patients**		
		Key Informant	
	Category	**1 2 3 4 5 6 7 8 9**	
	Spectacle magnifier	* * *	
	Hand magnifier	* * *	
	Stand magnifier	* *	
	Telescope	*	
B.	**Perceived predictors to optical LVDs preference**		
	Category	**Participant**	**Verbatim**
1.	Age	Key Informant 1	*'Based on my experience, I have noticed that younger patients prefer stand magnifiers 'while older adults prefer spectacle magnifiers'*
2.	Cosmesis of device	Key Informant 5	*'Patients prefer devices that look appealing and conventional'*
3.	Occupation	Key Informant 9	*'The type of optical low vision devices accepted by a patient is influenced by the tasks or occupation he or she does'*
4.	Ease of use	Key Informant 4	*'Low vision devices that are simple and patients are able to understand how to use them are usually preferred by most patients'*
4.	General well being	Key Informant 7	*'I don't prescribe hand magnifiers to patients with hand tremors. I would rather prescribe a spectacle or stand magnifier'*

Discussion

This study showed that more male low vision patients were seen than females. This could be attributed to more activities and visual demands in work for males as well as less access to health care including eye care by women. The finding was similar to other studies[3,24,26,27].

From this study, spectacle magnifiers were the most accepted optical low vision device for adults above

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30 years at near. This is in agreement with several other similar studies[23,28,24,3,25,26]. The high frequency of spectacle magnifiers prescribed could be due to the fact that they are readily available and more cosmetically acceptable by most patients because they are like conventional spectacles. In contrast, some studies[29,14,13] showed that stand magnifiers were the most prescribed optical near low vision device for adults . Others conducted[19,27,16,30] found hand held magnifiers to be the most prescribed near optical low vision device.

From this study, a significant relationship was found between age and occupation on the uptake of telescope and magnifiers, respectively. This relationship showed that the age group less than 30 years who were predominantly students, preferred stand magnifiers and telescopes. This could be due to the fact that students had challenges that affected their ability to see the blackboard clearly, thus requiring telescopes, the only optical low vision device for distance tasks. The preference for stand magnifiers may be due to the need for stability while reading and writing on the desk by students which the magnifier gives[31]. These findings are contrary to some studies[21,15,36] which found no association or relationship between age and the uptake of telescope. However, the age group above 30 years, skilled and unskilled workers preferred spectacle magnifiers. The preference for spectacle magnifier could be due to the near work challenges most often faced by these groups and the need for a device that is less conspicuous to the visual challenges and socially acceptable, which the spectacle magnifier offers. It could also be attributed to its hands free, wider field of view, cosmetically appealing and socially more acceptable than other optical near low vision device[31]. This finding are in agreement with the study[32] which found that spectacle mounted magnifiers were chosen by those actively involved in office work. These relationships between age, occupation and the preference for a type of optical low vision device could be related to the fact that utilization of optical low vision devices is task or occupation specific. Tasks or occupation are usually age-dependent. These findings are also in agreement with the statements of most of the low vision practitioners in the North West. They stated that based on experience in clinical practice, the visual needs of the patient were often borne out of the occupation or vocation, (more than age or gender).

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This is one of the major factors that influence the choice of optical low vision devices to be prescribed to the patient. This implies that the age and visual tasks (based on occupation or vocation) are critical factors that must be known and applied to give the patient the best possible optical low vision device suited for his needs.

The study also showed that majority of the telescopes prescribed were monocular hand-held. This could be due to the visual demands by the patients, required higher magnification (above 4X) to see objects clearly at distance and these were only available as monocular handheld telescopes than as binocular. While the binocular telescopes available were within 2.8X and 3.5X magnification. However, this is in contrast to a study[14] which showed that binocular telescopes were more prescribed. Majority of the patients in the study who received telescopes and stand magnifiers were students. This is likely due to the fact that most students with low vision have as one of their major challenges, difficulty viewing distance objects- school board and the only low vision device at present, capable of magnifying images at distance is the telescope[31]. While the high frequency of stand magnifiers by the student population may be due to the portability of the magnifier as well as their stability on the reading material on the desk. There is also minimal lifting of the magnifier as is the case with hand-held magnifier, so less fatigue of the hands experienced[31].

The study also showed that those who benefitted most from optical low vision devices (either telescopes or magnifiers) were those with moderate visual impairment after best correction of VA between 0.6 and 1.0 logMar. This is also in agreement with the study by Schmier[33].

The mean magnification power given in this study for telescope was 6X, followed by 8X and 4X. This is contrary to some studies[34,35] where the mean magnification given for telescopes were 4.8X and between 2.1X and 5.3X, respectively. This low magnification given in these studies could be due to the fact that the patients used in the studies had advanced diabetic retinopathy and glaucoma, conditions with existing peripheral field defects and thus the use of high magnification powers would be counterproductive due to further constricted fields.

The highest range of lens dioptric power prescribed for magnifiers was between 4D and less than 12D. This may be due to the fact that majority of the patients who accepted these optical low vision devices had moderate visual impairment after best correction of VA of between 0.6 and 1.0 logMar. Higher magnifications above 28D were very minimal, less than 20 persons in all. This could be due to reduced field of view associated with increase in magnification[36] and would not be comfortable for patients to read with. These findings were not in agreement some studies[34,35,37] in which the mean

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magnification prescribed for near optical devices were 5.6X and 5.7X (approximately 24D, using 1X = 4D), respectively.

The results from the low vision practitioners in the North West show that non-demographic factors perceived to be predictors to the uptake of optical low vision devices include ease of use of the device, general well-being of the patient as well as cosmetic appeal of the device. This would likely be because the ability of the patient to use the device without much intellectual or physical challenge will encourage the patient to use the device. The appearance of the device would also be important to most patients because they would likely not want a device that draws attention to the fact that they have visual challenges especially as we live in a society where issues relating to visual impairment have thus far received less attention than deserved. The physical and psychological well-being of the patient is also very important to the uptake of an optical low vision device because a patient needs to be physically and mentally sound to understand how to effectively use the device. This is in agreement with a study[38] that showed that both quality of device and the appearance of the device influence uptake of low vision devices.

Information obtained from this study was based on one center and perceptions of few low vision practitioners which may have been subject to any inherent limitations in the examination of the patient and in the professional judgment of the examiners. Furthermore, preference of optical low vision devices by the low vision population served by the clinic and perceived by the low vision practitioners could have been influenced by the availability of these devices in the clinic and centers of the key informants.

Conclusion

This study suggests that preference for spectacle magnifiers among low vision patients, significantly increased with increasing age and being a worker. While the sex differences were not statistically significant. The study has also provided baseline information to low vision practitioners in the stocking of optical low vision devices and cost effective management of low vision patients.

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